Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Wave:

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO

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Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 69
Number 19

CHICAGO, SATURDAY, NOVEMBER 6, 1915

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

OPPORTUNITY AND SUCCESS.

Lack of success is not caused by lack of opportunity. Men grow their own opportunities, but they often fail to harvest the crop. The time a man spends in envying the success of others could better be spent in trying to emulate the process by which that success came, and in gathering the ripened fruits of opportunities.—Edmund Ward.

Distribution of the Rewards of Efficiency.

Efficiency and scientific management have been more or less jeered at. But these doctrines, despite opposition, have gained ground solely upon the results which they have shown. Under the terms, "efficiency" and "scientific management," many ideas and methods are included which have apparently been of great economic advantage to industrial concerns. The rise in railroad maintenance and operating costs combined with practically no change in revenues has forced railroad officials to investigate and apply many of the ideas and methods to their own business.

Many telephone companies have likewise formulated and put into effect policies and practices that tend to minimize maintenance and operating costs, and at the same time keep up to standard the maintenance of their plants and service. Thus it is that one telephone company is highly successful while another, operating under conditions quite similar, is continually in difficulties.

Again and again have state commissions made investigations of public utilities. In many cases these investigations have revealed that the enterprises were not conducted efficiently; service was poor; equipment run down and no provision made for replacing it. It was claimed that existing rates would not permit of better service. Uniform systems of accounting were ordered by the commissions so that costs could be determined.

Rulings were made directing many of the utilities investigated to set aside certain amounts for maintenance and depreciation. Where rates were insufficient to permit the setting aside of funds for these purposes they were, in many cases, adjusted. In other cases methods were indicated for effecting economies. Standards of service have been prescribed by many commissions. Thus poorly operated companies are forced to practice efficiency.

The question has repeatedly been asked: To whom does the reward of efficiency belong? To answer this question, prevailing conditions must be reviewed.

There is now a quite general recognition of the common interdependence of public utilities and the public served. The people are now coming to realize that, in a sense, they are silent partners and can only obtain their share of the returns when the utilities are operated at a profit. The utility managers—in reality the trustees of the investing public—on their part, are beginning to understand that a certain financial security goes with public confidence.

Probably the most important contributing cause tending to bring about this change of spirit on the part of the public and the utility management, is the creation of the various regulative bodies, both state and national.

In the trend of the decisions of the higher courts, national and state utility commissions and recent legislative acts, combined with the changing spirit of corporations and the general public, may be found indications that point to an answer to the question as to whom the reward of efficiency belongs.

More and more are public utilities encouraging employes to become shareholders in their enterprises. In other words, they are entering what may be termed the co-operative class. Thus we have the owner, workman and public in partnership and each expecting a share in the profits. But the public can demand its share of the profits—lower prices—only after an adequate profit has been provided for capital in the shape of a reasonable return upon the investment, and for labor in the shape of fair wages.

Factors Tending Towards "The Revival of Business"

One of a Monthly Series of Articles Written with a View of Helping Readers to Think, by Supplying Fundamental Information Rather Than Conclusions—The Steel Business and Railroads—European Loan and Its Effect on Industry—The Crops

By Frank M. Huston, *Financial Editor, Chicago Evening Post—Editor, Rand McNally Bankers' Monthly*

With the volume of our exports increasing by leaps and bounds and justifying an estimate by Washington of more than $3,716,200,000 for the fiscal year, 1916, compared with $2,716,200,000 for 1915, there is ample assurance that there lies in this enormous strengthening of our financial position in the world's commerce, sufficient reason for the expectation of a decided broadening in our industrial and commercial activity.

Already the barometer of industrial tendencies, the steel business, has expanded to more than normal conditions. Mills are operating to a capacity beyond that regarded as possible prior to a few months ago. While the impetus for this broadening of activity came as a result of the abnormal export trade—orders for munitions and supplies made necessary by the war—yet our domestic steel business has returned to normal proportions, according to experts in that industry. The mills for weeks have been unable to take business for delivery during the early months of 1916, and the capacity of these big plants are being strained to the limit to care for business that is offering for the later months of next year.

Were the railroads to enter the market for their usual tonnage in normal years, the congested conditions of the steel mills would exceed anything ever experienced in the history of this country. But the railroads are still holding back in making commitments that will tend to increase their facilities for handling future business. It is essential that adequate transportation facilities be provided for the prompt movement of commodities and merchandise if this country is to realize her full measure of prosperity. But railroad credits have been impaired, whether by acts of commission or omission in the past matters not. The essential feature is the conditions that confront us, not the theory.

The railroads have been forced by sheer circumstances to increase their operating costs, through the granting of wage advances, increased cost of material, additional safety appliances, and other safeguards, and so far they have been refused material or corresponding increases in revenue from traffic sources. This has weakened their credit and causes investors, except in exceptional cases, to hesitate in lending the fresh capital needed for expansion purposes. Until the railroads are sufficiently encouraged by a governmental administration and legislative attitude and through concessions of increased revenue, they will continue to provide for future needs only in the most moderate way.

The attitude of the government at Washington is manifesting a decidedly more friendly spirit which, ere long, may find a response in a change in the attitude of investors and enable the railroads to buy more steel. This will take up the slack that may be expected when the curtailment of war orders from abroad begins to manifest itself.

Money is accumulating so rapidly in our banks that it is becoming burdensome. This excess of commercial funds and credit is already beginning to stimulate investment, despite the feeling of caution the vast destruction of capital abroad in the war caused to manifest itself in the first year of the European conflict.

This country is forging to the front as the leading financial nation of the world. Today, it is the center from which financial energy is spreading to Europe and, with the broadening tendency of economic power and civilization centering here, the development of the next few years must necessarily afford an impetus for a broad expansion of business.

We are already lending credit to Europe, as is instanced by the credit loan of $500,000,000 to France and England. This is not a loan of money. It is in reality a loan of goods, such as grain and other foodstuffs, and manufactured articles. It includes, of course, munitions. Europe would have to buy munitions here whether we extended credit or not, but she might economize on many of her other purchases in this market and find other sources to supply her wants in the way of commodities other than munitions, were we to deny her the credit sought.

This extension of credit broadens our scope of activity. It gives our working men employment, our manufacturers a demand that is both profitable and stimulating. It is making this country, temporarily at least, the leader in the world's commerce. But it brings added responsibility, which will necessitate greater preparedness to protect our commerce and our business interests. All this means a broadening of industrial activity at home. It means additional buying power for the great industrial element of the country.

Nature has bestowed bountiful crops on our agricultural sections. One striking feature of this crop season has been the necessity of a progressive revision of estimates of our agricultural production. The latest available government estimates show, instead of a wheat crop slightly in excess of 900,000,000 bushels, the greatest wheat production in the history of any nation—a production in excess of 1,000,000,000 bushels. It shows a corn production nearly as great as that of 1912 and

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considerably in excess of 3,000,000,000 bushels. It shows a production of oats only slightly below a billion and a half bushels and other crops proportionately large. Instead of our production of new wealth from the soil approximating around $10,000,000,000, it is necessary to revise these estimates because of the continuation of war prices for our surplus products. It is the demand for our surplus and the prices received for them that establishes the value of our crops, and there is reason to believe that an estimate of $11,000,000,000 for the new wealth created from the soil is not excessive. This means at least three times that amount of fresh credit.

Fundamental conditions were never better in this country for an expansion of trade and general business; the one retarding feature being the lack of confidence, which is attributable largely to uncertainty regarding the economic effect of war. But gradually the idea is gaining that the immediate effect of the war will not be as disturbing as the ultimate effect, and that there will be an intervening period of great prosperity in this country. Soil conditions for next year are remarkably favorable. The soil is well soaked and any absence of rain is likely to be offset by the storage of moisture in the ground during the past two years.

With these assurances, there is every reason to believe that the consumption by our own people of breadstuffs and the use of hardware, building material, and all classes of commodities, even the luxuries, will increase.

Labor is well employed. The number of idle men has been steadily reduced, both by the departure of those owing allegiance to countries at war and the inincreased demand in our mills and shops for artisans.

Some Suggestions as to the Proper Care of Dry Cells

Methods of Handling, Storing and Testing New Shipments of Dry Batteries—Testing by Means of Ammeter or Voltmeter—An Emergency Test—Regular Inspection of Dry Batteries in Central Offices and at Subscribers' Stations

By W. W. Kinsley, Jr.

Now that dry batteries have nearly, if not quite, replaced the old wet style, telephone men are sharply considering methods that will make them as highly efficient and economical as possible.

A good dry battery can be made to give excellent results in connection with telephone work, as the current consumption under normal conditions is very small. It is absolutely essential, however, that the dry batteries be inspected regularly and all defective ones immediately removed and replaced with fresh ones.

Most dry cells are protected with a pasteboard casing and the latter will absorb moisture if not kept in a dry place. This will cause a quick deterioration of the battery, especially when put in service, as a leakage of current will then exist between the adjacent cells.

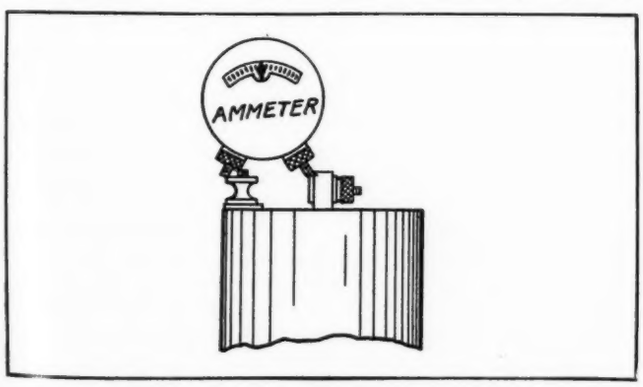


Fig. 1. Ammeter Connections Touching Poles of Dry Cell.

All surplus stock of dry batteries should be kept in a cool, dry place, but where they will not freeze. A dry battery, when cold, will not show a full reading on a testing ammeter, but may give good results at a normal temperature. Barrels of dry batteries should be trucked and not rolled or turned from end to end, when moving them. They should be unpacked promptly and placed on end, on shelves so that if there is any dampness or leakage it will not be communicated to good batteries. As dry batteries deteriorate on the shelf, old shipments should be used before those of a subsequent shipment, thus preventing any very old batteries from getting into use.

When installing dry batteries that have been kept in storage for some time, each cell should be tested with a reliable pocket ammeter, or other current indicating device, to make sure that each cell is of full rating. All cells that have damp or moist pasteboard coverings should be rejected. If an ammeter is used, each No. 6 dry cell should show a discharge of at least 15 amperes when the ammeter connections are made direct to the terminals, as shown in Fig. 1, and not fall below this amount when the discharge is maintained for about five seconds. Used batteries, or those in service, should be discarded when the reading thus taken falls below two amperes. Continuous discharge of this sort is rather severe on the battery and must not be maintained for any longer period.

In making ammeter tests each battery should be tested separately and the ammeter connected directly across the metal binding posts of the battery. In all current tests, have the ammeter firmly connected with the battery binding posts as a slight resistance in the contacts will cause a false reading, the needle then indicating a small current flow.

If a voltmeter is used for testing, it will be necessary to discharge the dry battery continuously through a low resistance, about two-hundredths of an ohm, such as can be obtained from a piece of No. 18 B. & S. gauge copper wire, three feet long, for five seconds. The resistance may then be disconnected and the voltmeter reading immediately taken. The connections are as shown in Fig. 2. In such a test, on new dry batteries, the voltmeter should give a reading of at least one and one-quarter volts when the current is discharged continuously through the copper wire for five seconds. An open circuit reading made across the battery terminals, but without any current discharge, will give no indication of the condition of the battery. As a matter of fact, a completely worn-out bat-

tery often will show full voltage reading on the high resistance voltmeter. This same battery will give practically no current and, if left in a series of batteries, will destroy the effect of the whole series.

When no measuring instruments are at hand a rough test for determining the output of a dry battery can be made by observing the heating effect on a piece of wire. If a 12-inch

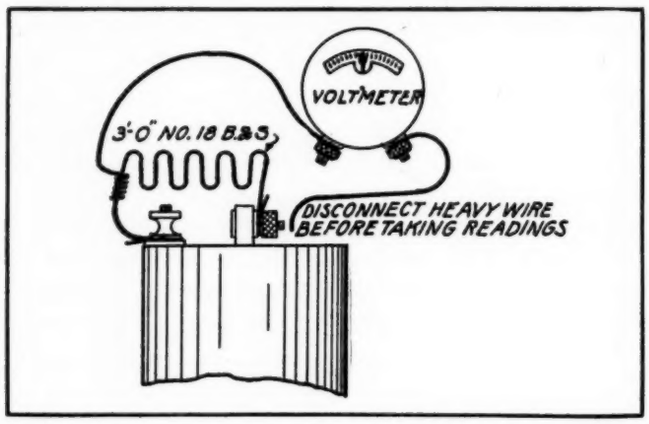


Fig. 2. Testing Dry Cell with Voltmeter.

piece of No. 30 B. & S. gauge copper wire is held across the terminals of a fresh battery, as shown in Fig. 3, it should heat up so as to be almost too warm to hold. If the current discharge maintains the same heat after the wire has been held against the terminals for five seconds, this battery can be considered good. This is an emergency test only and is not recommended for regular use.

While preliminary tests will allow poor cells to be discarded when installing them, these tests must not be considered final. Even in the best makes of dry batteries local chemical action will destroy their efficiency after being in use a few weeks.

In a previous article (TELEPHONY, September 7, 1912, page 350) a type of dry battery cabinet designed for use in a central office was described. A cabinet was fitted with shelves, so spaced as to permit trays of 27 cells to be readily inserted. The batteries in each tray were connected together and the end batteries were connected to binding posts mounted on the edge of the tray. As the batteries fitted loosely and were on end, deterioration from contact was reduced to a minimum. The cells were in excellent position for testing and the

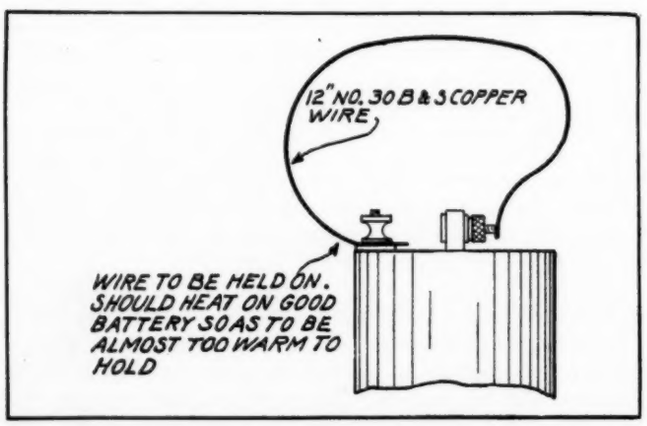


Fig. 3. Emergency Test of Dry Cell Without Instruments.

whole tray could be discharged for test at once. The resistance in that case was regulated so as to give an ampere flow of about one-quarter ampere for ten minutes.

In central office work, dry batteries should be inspected at least once a week, and all batteries which show a low discharge should be replaced with fresh batteries of full rating. Subscriber's stations should be inspected semi-annually.

All dry batteries should be replaced which show moist or wet places in their pasteboard coverings. Such batteries will dry out quickly and cut down the effect of the good batteries, and in addition will cause a short-circuit in adjacent batteries and eventually ruin them. In this way the cost of battery renewals will be reduced to a minimum and it will not be necessary to replace all of the batteries at one time.

It will be found that the best results will be obtained by using dry batteries of the same make and size, in series or series-multiple connections. In wiring the batteries, great care should be exercised to see that they are properly connected together. Heavily insulated copper wire, at least as large as No. 18 B. & S. gauge should be used for connection between the cells, and from the battery to the rest of the circuit. The ends of these connecting wires should be scraped bright where they are held by the binding posts, care being taken to see that the wire is not nicked, as a slight cut of this sort will be sure to cause a break at some future time. Clamp the ends of the wires so as to avoid short-circuits between adjacent battery terminals and connecting wires.

Convention of Local Owners' Association of Texas.

Initial steps in a campaign which is expected to bring every locally-owned telephone company in Texas into the organization, were taken at the annual convention of the Local Telephone Owners' Association, held in Fort Worth, October 27 and 28. Previous to this meeting the association had been rather loosely organized and a much more compact and effective organization was completed at this time, with the idea of building up the association as much as possible and giving the greatest possible benefits to all of the members. A resolution was adopted making each member a committee of one to get in another member, and the enthusiasm with which it was adopted indicated that the members meant business.

The address of welcome was made by Mayor E. T. Tyra, of Fort Worth, who paid a high tribute to the telephone pioneers as builders of civilization, and spoke of the wonderful progress which has been made in the science of telephony.

F. W. Greber, of Brownwood, responding to the mayor's address, thanked the city through him for its hospitality. He said he was speaking on behalf of 1,000 telephone owners, with millions of dollars of investments, held by local stockholders.

While there was no definite action in regard to the work to be taken up by the association during the coming year, it seemed to be the understanding among the members that something will be done before the next legislature meets to have the gross earnings tax on telephone companies in Texas reduced. It was pointed out that the companies now pay 15 times as much taxes as the ordinary tax payer and three times as much as the telegraph companies. The telephone companies now pay 1½ per cent. gross earnings tax, while the telegraph companies pay only ½ of 1 per cent. It is claimed by the telephone men that this tax is a burden on the business which ought to be reduced.

A poll was taken to ascertain how many stations were represented at the meeting and it showed 28,500 stations. There are already many more than this number represented in the state organization and several times that number in the small companies in the state.

It was decided to admit manufacturers and supply men to the association as honorary members. Conventions will be held annually hereafter and the term of the officers will be for one year.

C. L. Alderman, of Big Spring, was re-elected president, making his fourth term in that office, and his son, Stan-

bery Alderman, also of Big Spring, was re-elected secretary. They are the only persons who have held those offices since the launching of the association. It was the father who called the telephone men together for the purpose of effecting an organization, and he and his son have been constantly its leaders ever since.

They are also president and secretary, respectively, of the Western Telephone Co., of Big Spring, which is said to be the biggest little telephone system in the state. The system owns about 1,000 miles of long distance wire and covers all of the territory surrounding Big Spring.

The other new officers are: First vice-president, A. C. Stuart, Texarkana; second vice-president, John Y. Rusk, San Antonio; executive committee, Sam P. Harben, A. J. Combs and S. O. Scott.

The chief recommendation made by Secretary Alderman in his annual report, aside from urging a careful attention to the burden of taxation, lest it become even more onerous, was to advise that discussion should be had as to the relations of the local owners' companies with their respective municipalities.

"Such relations are vital to your interest," he said, "and the experience that each has had in the past should be made known to the others, as such information will assist materially in the future."

An address of especial interest was given by Prof. E. E. Scholl, of the state department of agriculture, in regard to the part the telephone is playing in rural life. He said that his department is constantly advocating the greater use of the telephone by farmers, and that nothing can contribute so much to solve the marketing problem, the problem of the movement of people from the country to the cities and the general improvement of rural life, as the telephone.

"The telephone is overcoming the isolation of farm life as nothing else could," said Professor Scholl. "It can be used in all kinds of weather, at every season of the year and practically at all hours of the day. When the telephone comes into general use in the country, rural life will become more socialized, and consequently more pleasant. It is the greatest force against the depletion of the country by the migration of the rural youth to the cities."

Interesting exhibits of telephone apparatus were displayed during the convention by the Automatic Electric Co., of Chicago, the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y., and the Frank B. Cook Co., of Chicago.

New Zealand Report on Telegraphs and Telephones.

The report of the New Zealand post and telegraph department for the year ended March, 1915, states that, including miscellaneous receipts and government telegrams, the total revenue of the telegraph and telephone business was £665,938 ($3,329,690) as against £579,816 ($2,899,080) in the previous year. The length of pole lines is 16,463 miles, an increase of 905 miles over the previous year.

On the outbreak of the war a military guard was placed at each of the wireless stations. Four operators and two men with engineering capabilities were sent with the first expeditionary force. Communication with Fiji was soon established, and from October 19, 1914, telegrams were accepted for transmission to Samoa. Communication continued to be carried on through that route for some time. Regulations for controlling the use of wireless on British and foreign ships, not registered in New Zealand, while they are within territorial waters, were gazetted on July 16, 1914, and are now in force. Observations are still being made at New Zealand stations of atmospheric electrical disturbances which interfere with the reception of signals. The data collected are being communicated to the British Association for the Advancement of Science.

The number of telephone subscribers increased by 3,808. The total number of exchanges is 250, made up of 62 central and 188 sub-exchanges. The total number of subscribers is 54,261 compared with 49,415 for the previous year. The number of subscribers connected to the 10 principal exchanges on March 31, 1915, was as follows: Auckland, 7,288; Wellington, 6,584; Christchurch, 5,164; Dunedin, 4,572; Gisborne, 1,472; Wanganui, 1,408; Napier, 1,375; Invercargill, 1,364; Hastings, 1,295; Palmerston, North, 1,096. New exchanges were opened in the Auckland district at Birkenhead, Coromandel, Kaikohe, Kawhia and Walton; in the Wellington district at Hinakura, Kahutara, Glen Oroua and Norsewood; and in the Canterbury district at Culverden, Dunsandel and Waiau.

The building to accommodate the apparatus of the new automatic system at Courtenay Place, Wellington, has been finished and the alterations to provide for similar apparatus at Newtown have been made. The automatic exchange building at Masterton has been completed, and some of the equipment installed.

Co-Operation and Harmony Among Toll Operators.

A comprehensive and sympathetic grasp of her position is displayed by Miss Claydie L. Stephenson, chief operator at the Home Telephone Co., at Marion, Ky., in the following paper, which was read before an operators' meeting held a while ago:

No telephone system is worthy of the name that hasn't a toll service which is adequate and efficient. It must embrace several exchanges as units to build up the whole. A chain is no stronger than its weakest link; neither is the toll service of any telephone system better than its weakest spot.

To strengthen this weak spot requires the co-operation of toll operators at the various exchanges. However, this co-operation alone will not bring about the desired results. **To have par excellent toll service we must have the co-operation of all employes, especially those who operate and maintain equipment.**

Harmony must exist among operators. Fighting for precedence, or any other cause, not only kills time and delays calls, but stirs up enmity, that grows into personal dislike. It is but human to have likes and dislikes; but to co-operate for the greatest benefit to our service this tendency must be eliminated, so far as it is possible to do so.

Operators should realize that their exchange is only a unit, built up of a number of smaller units, so far as toll service is concerned. So to speak, each station is an atom, each exchange a molecule, each system an object. This sub-division must be observed or we will be likely to think of our respective exchange or calls as being the most important, thereby not merging with the whole and creating harmony.

Locating parties is often difficult, so it behooves us to be persistent on in-calls and patient on out-calls, when such is the case. When possible gather such information as business and residence, telephone and street number, and where likely to be found, as this helps wonderfully in locating a party.

Toll calls should be handled as rapidly as is consistent. Sending and receiving operators should be prompt to notify when circuits are idle, for, as it is put in railroad vernacular, a still car earns no money and blocks traffic; so with a dead connection on toll lines.

Co-operation with operating and other branches is essential. A first class toll circuit will not transmit from a poor substation. So it is up to the mechanical department to see that each telephone is a toll station, so far as its duties are concerned. The office crew should at all times stand behind the operating department in charges for overtime. There is often a disputed charge; therefore, in his work the collector should be firm and show the public that he believes in the operating department and its ability to properly discharge its duties.

In conclusion Miss Stephenson noted the benefits to be gained by co-operation, saying:

First, we get better and faster service, thereby enabling the maximum amount of actual service on lines available, more patronage on account of rapidity and efficiency, and perhaps preference where more than one service exists. All these things go to increase the net earnings of the company, and to please the public we serve.

Some Factors to be Considered in Fixing Depreciation

Methods of Ascertaining the Probable Lifetime of a Telephone Property—Difference Between Maintenance and Depreciation—Local Conditions to be Taken Into Consideration—Address Made at Convention of the National Independent Telephone Association

By E. C. Hurd

Depreciation is a term that our lexicographers have undertaken to define as meaning "the act or state of lessening worth or being." I do not know that that can be gainsaid. Our recent experience, especially with commission regulation and the conduct of public utilities, brings the matter up again vividly.

There has been a further definition given to this term and some of the state laws even have endeavored to set out what depreciation is in this relation. E. W. Doty (formerly of the Ohio Public Utilities Commission) stated, if not misunderstood, that time—possibly it was age—did not have anything to do with depreciation. Some state laws put it this way, "occasioned by time, weather, wear and tear, and use." Furthermore, we have undertaken to add the scientific terms, "supersession" and "obsolescence," and we find public regulation has something to do with it. Do not understand that to mean public utility commissions. It means your city authorities who require certain construction.

Depreciation is a scientific fact. We admit that as an axiom which needs no discussion, and that it is a matter to be dealt with in the conduct of the public utility. It is an element on the first appearance of expense or operating expense.

How to Treat With Depreciation.

The next proposition is, how to treat with it—how it should be applied, what does it affect or what is its effect, and what is the measure of it. Those are mighty easy questions, but they are not all so easily answered.

One of the very creditable things of the public regulating bodies is their recognition of depreciation. In fact, I have seen some commission orders issued in which it was emphasized to the extent that a plant in operation should not pay any dividends, until certain depreciation was provided for. I think that is the general custom.

There has been considerable argument in this convention as to valuation. It is one of the features of public regulation, although it has other phases which have already been touched upon by other speakers. Valuation cannot be discussed without taking depreciation into account. Valuation is very closely related to rate-making and, therefore, you are going around in a circle. You have these various things and they are all inter-related, so depreciation cannot be discussed without discussing regulation, operation, or valuation. Of course, by that is meant certain phases of valuation.

The general problem in all valuation matters, today, seems to be to find a cost or investure. Depreciation is usually closely allied, whatever the principle is you are operating on. If in your first column you have reproduction cost new, everybody expects another column, sometimes called present value.

This term I think is a misnomer and misleading. It represents a present state relative to the first statement. It cannot represent anything else because you have that depreciation in certain phases to your first resultant. Therefore, you have an operation upon your first statement and we will assume in the majority of cases that that is the investure. By that method you have undertaken to lessen the amount of your investure by depreciation.

Two general plans have been adopted and they are pretty closely related in some respects. One is on the straight line basis and the other is on the 50 per cent. scheme. The first is simply intended to be a scientific method of finding out how long a structure is going to live or how long it is going to exist in use in the plant. There seem to be two or three ways of getting at that. One is historical, another is through observation, and another is purely estimation. The three may be illustrated in this way:

Ascertaining the Lifetime of Any Structure.

If we have a line of poles of a certain character which were put in say, 15 years ago, we know historically that 50 per cent. of them disappeared in ten years. We will say that the next row of poles put in under similar conditions, of the same size and quality, would last at the same rate. Now, some of those might still last 20 years. The table does not become disproved because some of them may last longer. The average life is what the calculation is intended to cover.

The next proposition is by observation. We had, in Nebraska, a particular name for it. It was called visual. It usually means that you cannot tell the life of a pole at all. But you go and look at it and you say: "I think it was five or six years ago that that pole was set and it looks as though it would last ten years longer." So the whole thing is hypothetical, except your assumption as to how long the pole is going to last. I do not say the theory is wrong or the basis is wrong but that is the way it is done.

The third method is this: There are certain classes of construction in telephone plants that are very recent. Take, for instance, the underground. I have not found anyone wise enough to tell me how long a certain piece of underground construction is going to last. It is an improvement over the old construction.

We do not know how long it is going to last, I admit that, but I have been in decisions with railroad commissions where we were called upon to state how long it was to last. We could not say we didn't know or something of that kind. We were expected to make some sort of an answer. Several of my engineering friends, and also myself, have attempted to say arbitrarily how long that was going to last.

We did not go to look at it. We knew when it was put in. We knew the character of construction. About the easiest way to make a guess on it was to say: "That is permanent work. I guess it will last 50 years." We would put it down at 2 per cent. on a straight line basis. That is the third method I know of putting down the basis for a straight line depreciation table.

In the accountant application of the straight line basis there have been other things brought out. For instance, it is intended to provide, not only for some occurring depreciation, but to anticipate. Therefore, we are building up a fund in the operation of the plant, intended to cover further depletion or expiration of certain parts of the plant. If that fund is reinvested—most telephone companies do not have it, but if you are fortunate enough to have any such thing as that—you have an option, usually.

of either reinvesting it in extensions or else of loaning it out to somebody on a certain rate of interest until it is needed. If there is any lessening of the straight line amount in that way in the anticipated depreciation, then that reduces the amount originally raised on the straight line basis.

Now, the 50 per cent. method: I have seen some fantastic things organized presumably on that sort of a basis. It does not seem to attack investure value, we might say, strictly as the straight line basis. It also assumes to attack value twice, although I may be mistaken in that. The whole idea is that a plant comprising a number of working factors is supposed to be leveled off to a certain basis and kept there. And, somewhat analogous to the straight line basis, after it is leveled off, so much is provided annually or periodically to maintain it at a certain efficient standard.

There are numerous tables and calculations proposed to give these results. They are largely theoretical. They may be correct. These are the two general plans used in measuring depreciation as affecting investure.

Again, we have subdivisions. Going back to the argument of straight line depreciation, the first thing brought up is that there is stated to be so much for maintenance and so much for depreciation. I have seen orders prescribing a certain percentage to be raised on a certain valuation, or certain investment for occurring or concurrent maintenance, and so much for anticipated or future renewals of parts. That somewhat complicates the situation, but it is all affected by depreciation, every bit of it. If our definition of depreciation is rational, it is all depreciation, but the occurred depreciation is called maintenance. That can be pretty easily measured in calling upon the costs—the actual amount that must be raised periodically to keep the plant at a certain standard. That, again, is yielding, because the policy of the company and the requirements, may greatly change, just what that standard is from time to time. Therefore, two accounts arise out of what may be discussed as depreciation.

By separating those two matters, a great deal of detail work is caused for this reason: We have a subscriber's set sitting on the table. If we destroy the whole thing, we call it depreciation, or if it is superseded by something else, that is depreciation. But if it falls off the table and the mouthpiece is broken, that is maintenance. Therefore, we run down a whole category of separation, but it means exactly the same thing. So when I say I am discussing depreciation I must, of course, discuss what is known as maintenance, unless I misunderstand the term depreciation.

It has been stated that every plant is individual unto itself. That is true, absolutely. That which may be relevant to one plant is not relevant to another, and a rate of depreciation in one locality under one condition may be far different from another not very far removed geographically. I have been guilty of organizing depreciation tables on various schemes and the further along we went the more we realized that the individual conditions surrounding one plant will not obtain with respect to another.

Local Conditions to be Taken into Consideration.

There are some things that must be taken into consideration of depreciation in any organization. You have a difference in soil condition. You have a difference in climatic conditions. You have a difference, perhaps, in the community in which you live or in which your plant lives. Your plant may be mostly rural. It may be mostly urban. It is found that the urban plant creates up-to-date, a higher rate of depreciation than the more rural one, although that rule may not obtain when we get all these wires and cables underground. But there are so many things which enter into the proper computation of a certain plant for depreciation, that a set rule or an average cannot be provided and come anywhere near fitting a particular case.

Something was also said as to the expectant life of a telephone property; that it really lives very much longer in many respects than we have anticipated. Now I understand how all these things have grown. The engineer is no different than other ordinary mortals. He is apt to be a little conservative. If he is representing the owners of the plant, he does not quite like to tell them that the things are going to be destroyed in twelve years and the plant must be rebuilt. He attacks it rather conservatively and stretches it to 15 or 20, not based on scientific fact but because he belongs to the human race.

You have heard considerable about the age of twelve years as the probable life of a telephone plant. I am not saying anything about the quality of plant. I am going to give you just one instance—a typical one—that may answer the question.

Probable Life of a Telephone Plant.

Not long ago I was called upon to make an inventory of a telephone plant of about $100,000 investment. Its principal place of business was located in an Iowa town of about 6,000 population. I could see in it almost ideal conditions with respect to the ordinary small plant. It was originally constructed eleven years ago, that is, construction began then. I should say from all evidence that three-quarters of the entire construction, so far as poles and outlying property were concerned, was erected about that time.

In making the inventory, the first thing noted was that about a year ago practically all of the downtown aerial work had been superseded by underground construction. The remaining open wire circuits were practically all in cables, built just a few months before I arrived. There was nothing outside, practically speaking, but drops and poles of an open wire nature. There were 740 telephone instruments in the city and about an equal number in the country.

The plant was constructed eleven years ago as a magneto plant; but it now gives common battery service. All the telephones in town and about one-third of the rural were operated by common battery. Something must have become of those magneto instruments. The original magneto instruments were purchased at the time the plant was first erected. The outside wiring and pole lines ran from eleven to nine years—a few of them of recent time were renewals.

By actual count there were 312 poles outside of the city and 284 of them were either rebuilt within those eleven years or else the management had plans to build them this year. I do not need to tell you about depreciation. There is an exact example of how long a typical plant will live.

They had public regulation in the city to make the wires go down; they had obsolescence, supersession and various other elements, which tend to destroy property and cause it to be replaced, and you see at a glance about the life of the plant. This is not very far from other cases of which I know.

We must not be too conservative about the rate depreciation affects such a property and to anticipate the future. We do not know. We are not wise enough to tell what new invention may upset all the things which we have to do with right now. To be too conservative as to the life of a telephone plant is perhaps unsafe.

I have heard a good deal about physical valuation. I spent five years with the railway commission in Nebraska

racking my brains over physical valuation, and after I got all through I wondered just exactly what it meant. We tried to segregate and say: "This is physical valuation." "This is complete valuation," and this is so on and so on. Then we tried to analyze the parts. We would say, this is so much for the physical machine and this so much for the intangible expenditures, development expenses, and so on. When we got through, we tried to add and find a complete value for the whole thing.

It occurs to me as illogical that a plant has one complete value. There may be costs for the plant, but how are you going to slice it down and say that the value of a plant for certain conditions, or certain things, is just so much? That does not seem quite sensible. Therefore, if I am discussing valuation, and I think I am in some of its phases, there immediately bobs up the question: What effect does depreciation have on value? What effect does it have on these intangibles? Now, you are asking a large question. I have not heard any one yet try to answer it. I have read some items affecting it. I have read some propositions and have asked some questions on those lines, but I will admit that there are some things I have not found out.

It is certain that the investment or cost is not value. It might be, but it is not very likely it is one and the same thing. Therefore, if we are calculating this depreciation on cost, we are not calculating it directly on value. But let us see. Investment does have somewhat to do with value. They are related. Under certain conditions they are intimately related. Therefore, if you are affecting investment, you must be affecting value in a related way.

If value is the thing, the worth of the property is the thing depreciation affects. How, then, does it affect it? In what manner, and how can it be calculated? If it can, what is the rule or what is the method?

In the study of depreciation for telephone plants it is quite familiar that, understanding the accountants' terms "depreciation" and "maintenance," any ordinary telephone plant will depreciate, according to some authorities, to the great amount of 6 or 7 per cent. per annum, based on an investment agreed upon, and that the maintenance will amount to about 3 per cent. The two added together give 9 per cent. represented as the ravages of this destroying element. While that might be an average, it will not apply to every plant. It is only a matter of average and not a matter of reference to your particular plant.

The Optimistic Operator.

Many good suggestions for telephone operators are contained in a paper on "The Optimistic Operator," read at a meeting of the Marion (Ky.) Home Telephone Co., by Mrs. Pearl McAdams, an operator in the company's employ. The paper has been prepared in duplicate by officials of the Central Home Telephone & Telegraph Co., at Louisville, Ky., for distribution among the exchanges of the system, and is as follows:

I notice among the operators that we are all more or less inclined to become pessimistic as our lives on the board lengthen, and it is of the opposite spirit that I wish to speak briefly.

In each individual there are opposing forces at war. The good fights the bad, health fights disease, strength against weakness. In the mind this war is going on between the faculty of looking on the bright side of things—called optimism—and the faculty of looking on the dark side—called pessimism.

As the strength of the arm is increased by proper exercise, and as the body is caused to grow and develop by the use of proper nourishment and exercise, so the mind is caused to develop by what it feeds upon and the exercise it takes.

The spirits of optimism and pessimism are inherent in each of us, and the development of one or the other depends upon the kind of thoughts we feed upon. It is just as easy to develop one as the other, and the results are not to be compared.

The benefit of optimism is not to be confined to one individual, however, but exerts its influence upon those whom the optimist meets. No doubt in your own experience and acquaintance you well know some operators who seem to shed sunshine and happiness every time they answer your call, and, though you may go to your telephone in the worst of humor you will leave it feeling differently when the optimistic operator has succeeded in "putting you through." Then there is the operator who has just the opposite effect on you; she is known as "Old Grouch" or "Miss Gloomy."

Answer your subscribers as if you are glad they called. If their party fails to answer and they say: "Oh, let them go, I never can get them anyway," give them this answer: "Let me try them once more for you; it is no trouble at all," and see if in nearly every instance they do not come back with a surprised "Thank you very much, Central." Only a little more time and trouble, but you have made a friend, and a feeling exists that otherwise did not. You are not only giving them kind, patient service for their money, but you are rendering a real service to the company.

Don't worry about any mistakes you may have made, but begin thinking about success. Brush the pessimistic cobwebs out of your brain, as well as out of the operating room. Brighten up yourself, and see what an effect it has. Make optimism a part of your thought. Talk optimism, act optimism. and you will soon be an optimist naturally.

Values Fixed on Ohio Telephone Properties.

Properties of the 15 companies comprising the Ohio State Telephone Co. have been valued by the state tax commission at $14,979,200. The Central Union Telephone Co.'s properties are listed at $15,347,120, an increase of $141,660 over last year, and those of the American Telegraph & Telephone Co. are placed at $5,662,100. The Cincinnati & Suburban (Bell) Telephone Co. is placed at $11,036,300, an increase of $404,580, and the Cleveland (Bell) Telephone Co., at $7,816,270, an increase of $157,940. Properties of the Central District Telephone Co., which serves eastern Ohio out of Pittsburgh, were placed at $1,584,970, a $209,560 increase.

The Telephone in Idaho and Montana Forestry Service.

The Idaho and Montana forest reserve is covered with 3,800 miles of wire, telephones being installed wherever of greatest advantage to the service. There are about 185 miles of wire strung in the Clearwater reserve, but it is the intention to extend these lines next season, as well as to make numerous extensions in other districts.

R. B. Adams, superintendent of the Idaho and Montana forestry telephone service, with headquarters at Missoula, Mont., states that permanent connections will be made next season between Orofino and Missoula by building a line across the Bitter Root mountains. Very little trouble, he says, is experienced by wires being broken down with sleet and snow during the winter, as atmospheric conditions are very different from the east, where so much inconvenience is caused by these storms. Trees falling across the lines hardly ever break the wire, for the reason that the lines are given plenty of slack when constructed. Poles are used only where trees are not available for stringing the wire, the insulators being suspended from the trees with a wire more often than nailing a bracket to the tree to hold the insulator.

New Telephone Plant in Ecuador, South America.

There are 2,926 telephone instruments in Ecuador, South America, of which 2,250 are in Guayaquil, requiring 2,539 miles of wire. The capital invested up to the end of last year was $181,687. At the close of 1914 the National Telephone Co. increased its capital stock from $50,000 to $125,000, the added funds being utilized in installing a modern telephone plant. When the installation is completed it is said that Guayaquil will enjoy a telephone service equal to that in the large cities of the United States.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

216. Why is a fault in the insulation of the common battery line circuit more apt to become aggravated than the same fault located on a magneto or local battery line circuit?

217. What made it difficult to formulate any method of comparing the effectiveness of telephone circuits for transmitting telephonic voice-carrying currents? What is meant when it is said that there is a loss of three miles in a certain type of cord circuit?

218. Determine from Fig. 90 the transmission loss due to the reduction of the battery feed to the transmitter to 0.04 amperes.

CHAPTER XII. The Central Office.

219. *Function of the exchange.*—The telephone exchange has become so commonplace and well known to all telephone men that an analysis of its several constituent parts and their functions cannot fail to bring out some of the underlying principles in an entirely new light. In an earlier section, the point was emphasized that the tremendous value and development of the telephone has been due to the arrangement of subscribers on separate and independent circuits leading to the exchange, affording to each party the benefit of the greatest possible *readiness to serve.* In other words the modern telephone system, by placing an instrument in the possession of each subscriber with the power to call the central office at any desired time and as often as necessary, has, by affording the most popular and useful service, insured its own great commercial development. In the broadest sense then, the telephone exchange is a central point at which all subscribers' lines are terminated in close proximity to each other.

This point may perhaps be more clearly brought out by contrasting the present system with some of the earlier ones. When, in the early days, the telephone instruments were placed on a series circuit, just as telegraph stations are now, it was not possible for any one subscriber to utilize his telephone service unless all the other stations on the same circuit were idle. The modern arrangement in which each circuit is individually extended to the central office and given an individual terminal before the operator, insures uninterrupted availability for service. When it is clearly seen that it is this individual circuit and the closely adjacent terminals of the other lines in the exchange which make modern telephone service valuable, it will be very plain why each telephone exchange, large or small, must possess the same elements.

220. *Elements of the telephone exchange.*—In every telephone exchange is found a switchboard, a terminal rack, and a power plant. The switchboard, from the simplest to the most complex, is an arrangement of line terminals permitting the establishment of such connections between different lines as may be desired. The terminal rack is a means by which any line in the exchange district may be connected to any terminal in the switchboard. The power plant may be used as a comprehensive term to cover all equipment designed to produce signaling current and other current required in the operation of the system aside from strictly telephonic voice current.

221. *The types of manual switchboards.*—In Fig. 91 is shown again the principle on which the magneto telephone switchboard operates. (See sections 129 to 131 inclusive, TELEPHONY June 19.) It will be recalled that it is always advisable to remove the winding of the drop or signal, *D*, from its connection with the line circuit whenever possible. It is also advisable for the line drop to be of high inductance in order to prevent loss in transmission when parties on the same line

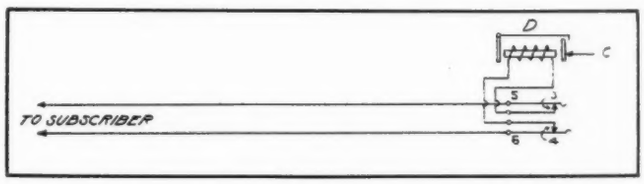


Fig. 91. Magneto Switchboard Line Circuit.

may be conversing without any connection through the switchboard and therefore without any plug in the jack 3, 4, 5, 6. It is true that the drop, *D*, may have a variety of forms differing from each other in many important details. In many cases the jack is not arranged to open *both* sides of the drop winding, as shown, but only one.

In order to relieve the operator from the labor of restoring the drop shutter, *C*, after answering a call from the subscriber's telephone, many devices have been worked out which effect the restoration of the drop shutter mechanically through the insertion of the plug in the jack. This effects a very considerable saving in the operator's time and also simplifies to some extent the wiring of the switchboard.

It is very true that the number of subscribers it is possible for one operator to serve satisfactorily, is limited. Obviously the less the actual work required from an operator, the greater number of calls it will be possible for her to handle. When the size of the exchange reaches a point producing a number of calls that exceeds this figure, other operators are required. Owing to mechanical considerations it has ceased to be possible in such cases to arrange the single line terminals (drops and jacks) at the switchboard so that they are equally accessible to all operators. An operator receiving

a call at one part of the switchboard must then be provided with facilities for transferring or extending the call to the distant part of the switchboard in which the called party's line terminal or jack might be found. This condition produced first

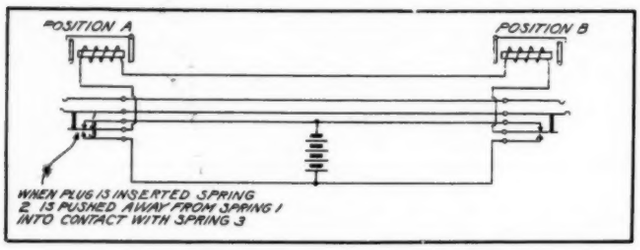


Fig. 92. Simple Transfer Trunk Circuit.

the transfer switchboard and later the multiple. These two types of switchboard arrangement are found in both magneto and common battery systems.

222. *Operation of the transfer system.*—A common form of transfer circuit is shown in Fig. 92. *A* and *B* represent any two operators' positions. The call to be transferred originates at position *A*. Over a separate circuit, called an order wire, the operator at *A* advises the operator at position *B* that she has a call for a line terminating on the *B* position. The operator at the *B* position *assigns*, by number, one of the transfer trunks between the *A* and *B* positions for this call. When the operator at *A* inserts the plug in the transfer jack at her position both signals, as shown, or lamps, if lamps are used, one at position *A* and one at position *B*, are operated and remain so until the operator at position *B* inserts her plug into the jack in exactly the same way as she would do in answering an ordinary subscriber's call. A similar arrangement exists between any two positions on the switchboard that are not adjacent.

223. *The transfer system and the handling of traffic.*—This very simple and commonplace arrangement contains all the elements of one of the fundamental considerations in the handling of telephone traffic. The telephone traffic in any switchboard follows certain definite laws. The amount of traffic to be handled at any given period in any given direction determines the number of circuits required. Intelligent design of the switchboard, from the simple transfer magneto switchboard to the automatic exchange, requires that the nature of the traffic be carefully studied and provided for. It must always be remembered that *any number* of telephone switchboard arrangements are perfectly operative from the electrical and mechanical standpoint. The actual test of their usefulness is, however, whether they will successfully handle the traffic with reasonable speed and reliability, as it reaches them through the wires of the system. To illustrate this point still further, it may be said that *any* form of transfer trunk is subject to the same form of analysis from the traffic handling standpoint.

The actual form of the signal used at the terminals may and does vary from the usual type of magneto drop, such as is used in the magneto line circuit, to the standard form of switchboard lamp. The lamp has the advantage of being small and compact and it is possible to associate it very closely in position with the jack of the transfer trunk to which it belongs. It will be proper to discuss a little later the relative merits of different types of *equipment* and circuits for this service, but at the present time we may, with profit, discuss the value of the transfer *system* of switchboard for handling traffic.

224. *Analysis of the transfer system.*—The general idea of a transferred call is shown in Fig. 93 from which all apparatus has been omitted for the sake of clearness. When the operator at *A* position answers the subscriber's call, one of the connecting cords, *C*, on this position must be used to establish the connection between the calling subscriber's line and the terminal or jack of the transfer trunk leading to the *B* position. As the operator at the *B* position *completes* the connection from the transfer jack to the called subscriber's line, it is necessary for one of the connecting cords on this position to be used. In other words, for each *transferred* call from one position to another position, *two* connecting circuits, one on each, are required.

The *average* call, therefore, in a transfer switchboard, would seem to employ and eliminate from immediate *readiness to serve*, more than the ordinary share of connecting facilities. While this is a matter involving slightly increased expense for connecting equipment, it is true that in many cases the expense entailed in making other arrangements to obviate the condition, is greater than that involved by the larger equipment required in cord circuits.

Let us for the moment briefly examine the matter from another standpoint. With the transfer system the operator's time expended in making a transferred call is increased considerably over the amount required to handle the non-transferred call. It is necessary to answer the calling subscriber, communicate with the operator at the second position, and to remove the connection when the conversation is completed. The operator at the second position must receive the call from the first position—roughly equivalent to answering a calling subscriber on her own position—complete the connection with the line jack of the called subscriber and remove the connection on the position when the conversation is terminated. In other words each operator handling a transferred call is compelled by the nature of the equipment to handle, in effect, two complete telephone calls.

The *average* call in such a switchboard makes, therefore, more demand on the time and energy of the operating force, while the service to the subscriber is bound to be somewhat slower and to tie up the connecting equipment longer than it would if no calls were required to be transferred. The reason that the service is slower is because the additional labor

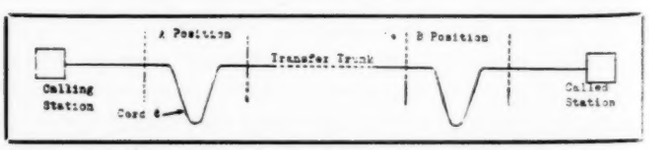


Fig. 93. Scheme of Transfer Trunk.

on the part of the total operating force for the average call is bound to require additional time, and the subscriber *must* wait for his call to be completed while this additional work is being done.

225. *Value of transfer type of switchboard.*—It must, how-

ever, be thoroughly understood that the transfer type of switchboard is an extremely valuable form of equipment for a very large class of telephone offices. In such offices the traffic will be found to be rather light for the number of lines connected, and the public not so insistent upon extremely quick service as is sometimes the case. In such cases the service furnished by means of a transfer switchboard may be very satisfactory.

The conditions may also be such as to indicate that the additional investment required by the installation of the multiple type of switchboard would not be justified. In fact there are many exchanges equipped with transfer switchboards, which, by careful attention to operating and care in maintaining the equipment at a point of high efficiency, give excellent service to their subscribers.

The transfer style of switchboard has to a great extent been used in offices, originally single position, which have grown beyond the original plans. In such cases it has been the policy of the operating company to add positions as needed, and to install transfer trunks from each position so added to all the previously installed ones which were not immediately adjacent to it. *(To be Continued.)*

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities and Actions of City Councils Bearing Upon Franchises, Rates and Service

Hearing on Sale of Interstate Company of Illinois.

A hearing on the agreement for the purchase of the securities and stock of the Interstate Independent Telephone & Telegraph Co., Aurora, Ill., by the Atlantic & Pacific Telephone & Telegraph Co., the holding company subsidiary to the American Telephone & Telegraph Co., was held before Commissioner Yates of the Illinois Public Utilities Commission at Springfield, Wednesday, November 3. After hearing what counsel for both sides had to say and hearing the testimony of witnesses, the commissioner took the case under advisement and the decision of the commission as to the approval of the contract will be announced later.

Through its attorney, O. F. Berry, the Illinois Independent Telephone Association at first entered objection to the proposed sale, but when the association was assured that present contracts for connections with the Interstate company will be allowed to stand provided the deal is made, its objections were withdrawn. The Kinloch-Bloomington and Wabash Valley telephone companies, parts of the Interstate system, were represented by attorneys in order to protect their interests.

The Atlantic & Pacific Telephone & Telegraph Co. now owns 60 per cent. of the stock of the Interstate company. Recently the minority stock and bondholders decided to get out if they could and negotiations were commenced through a committee representing them for the purpose of making the sale to the Bell company. Attorney Hamil, of Rosenthal & Hamil, represented the bondholders at the hearing. His firm negotiated the deal. It is stated that the price allowed is a little more than the actual value of the physical plant. The purchasing company is to allow the following payment:

For stock (7,136 shares) 4 per cent. of par value; for equipment notes 70 per cent. of par value; for $46,000 of Northwestern Telephone Co. bonds with unpaid coupons, 46 per cent. of par value.

The purchasing company agrees to allow the physical plant to continue operating as at present.

Apartment and Hotel Association Asks for Interchange.

An application asking the Oregon Public Service Commission to order an interchange of service between the Pacific Telephone & Telegraph Co., and the Home Telephone & Telegraph Co., at all apartment houses and residentials hotels in Portland, was filed with the commission October 21, by the Apartment and Hotel Association.

The allegation is made that the commission in a recent order directed the interchange of service between two systems in hotels in Portland similarly situated as is the Hotel Oregon, and that the refusal of the companies to extend it to apartment houses and other hotels constitutes a discrimination. According to the commission this order only contemplated an interchange of service where facilities for it were already installed, and the application now before the commission asks for it in hotels and apartments houses regardless of this fact.

Divided Ringing for Boston Four-Party Lines.

As a result of conferences with the Massachusetts Public Service Commission, the New England Telephone & Telegraph Co. has agreed to install divided ringing on the four-party full suburban service lines in the Boston metropolitan district, beginning with the issue of the next telephone directory in February, 1916.

The first important order issued by the commission in 1914 covered the restoration of four-party service to the company's schedules. Prior to the previous telephone investigation of the Massachusetts highway commission the telephone company had declared the six-party service obsolete, and the new schedule of rates presented by the highway commission before the supervision of telephone matters was placed upon the public service board made no reference to either four or six-party line tariffs. The company extended the life of the four and six-party schedules from time to time, but finally fixed July 1, 1916, as the date on which the six-party service should become extinct.

As a result of a petition of the United Improvement Association for the restoration of both four and six-party services on the ground of their popularity, the commission issued a finding which declared that the six-party service was detrimental to the standard of operation demanded in a densely populated area like the Boston district, but restoring the four-party service for further trial, subject to renewed consideration on request of the company or of the public.

The commission assumed, with the issue of this order, that the company would apply all the latest improvements available to the four-party lines in the district, including divided ringing, but the company took no steps in the latter direction, although in important centers outside the Boston district divided ringing was utilized on four-party service. Early this year the commission inquired of the company as to the status of the matter, feeling that whatever action might subsequently be requested by the public, could not be decided equitably with regard to the four-party lines, since this service had not had the benefit of an improvement which other services had enjoyed and which was

successfully applied outside the Boston district. Following conferences in which the company advanced the contention that the demand for divided ringing among four-party line subscribers was small, the representatives of the commission convinced the company that the point of view was erroneous, resulting in the agreement as outlined.

Enjoined from Discontinuing Long Distance Service.

Two large Fort Worth grain companies, the Walker Grain Co. and the Julian A. Ivy Grain Co., have gone into court and secured temporary injunctions to prevent the Southwestern Telegraph & Telephone Co. from cutting them off from long distance service.

The plaintiff companies alleged that their business with the telephone company often amounted to $2,000 per month and that on account of its magnitude they have kept a close check on the time consumed in the different telephone conversations; that there has been dispute in regard to the amount due and that the telephone company had threatened to deprive them of service unless settlement were made on the basis which it claimed to be correct.

Urges Delay in Probe of Wisconsin Company.

Max Schoetz, assistant city attorney, of Milwaukee, Wis., has written to Alderman W. C. Wehe, chairman of the council judiciary committee, recommending that the resolution directing a probe of the relations between the Wisconsin Telephone Co., and the American Telegraph & Telephone Co., be shelved for the present. Mr. Schoetz points out that such an investigation before the Interstate Commerce Commission would prove expensive and take a long time to decide, and that it would be advisable to wait the results of investigations in other cities. The communication also suggests it would be better to await the decision of the state railroad commission on the present rate case pending before it.

Responsibility for Delay in Transmitting Message.

Is the Iowa Telephone Co. responsible for the fire damage which results through delay in transmitting a call over its lines to the fire department? This question was submitted to the Iowa Supreme Court in the case of Providence Washington Insurance Co., appellant, vs. Iowa Telephone Co., appealed from Scott county.

It is charged that the telephone company took more than half an hour to transmit a call to the fire department in Davenport, and that by the time the firemen had arrived an automobile and part of a barn had been destroyed. The owner of the car collected $2,700 fire insurance from the Providence Washington company, on a policy on the burned property. The insurance company is now seeking to recover the amount from the telephone company.

Southern Bell Gets Franchise in New Decatur, Ala.

After a number of years of litigation the fight between the city of New Decatur, Ala., and the Southern Bell Telephone & Telegraph Co. has at last come to a close by the city council of that city granting the telephone company a franchise. This case has been in the courts of the state for a number of years. The franchise is for 30 years and while it raises the telephone rates, it will be several months yet before the rate increase becomes effective.

Petition for Interchange at Indianapolis Hotel.

The Indiana Hotel Co., which operates the Claypool Hotel, Indianapolis, has filed with the Indiana Public Service Commission a petition asking the commission to order the Central Union Telephone Co. to connect its lines with the hotel telephone systems. The hotel company owns a complete telephone plant including switchboards and about 600 connections, at present being operated by the Indianapolis Telephone Co. The action charges that the Central Union refuses to connect with the hotel plant unless the hotel disconnects the Indianapolis Telephone Co.'s lines.

Citizens Company of Grand Rapids to Market Bonds.

For the purpose of making extensions and other improvements the Citizens' Telephone Co., of Grand Rapids, Mich., has asked permission of the Michigan Railroad Commission to market $100,000 additional in bonds. The company was authorized to issue $750,000 of these bonds, $500,000 were at once taken down. A year ago an additional $100,000 was taken down, and now $100,000 more is asked for. Of the bonds already issued $527,500 is in the hands of the investing public and $72,500 is in the hands of the company to use as collateral.

Sale of New Jersey Properties Approved.

The sale of the Inter-State Telephone Co., of New Jersey, to the New York Telephone Co., was recently approved by the New Jersey Public Utility Commissioners. The Inter-State Telephone Co. was purchased at a receiver's sale several months ago. James Kerney, of Trenton, was the receiver for the company. The sale has already been approved by the Court of Chancery.

The Inter-State was purchased for one dollar plus an encumbrance of over $2,000,000. The sale of the Paterson, Passaic & Suburban Telephone Co., to the New York Telephone Co., has also been approved. George F. Wright, of Paterson, was the receiver for the former company.

Michigan Farming Community Has Telephone Connections.

Skanee, a prosperous farming and lumbering community in Baraga county, Mich., was recently given telephone communication with the outside world on the completion of the line between that village and L'Anse. The new telephone line has been built by the Baraga County Telephone Co. Work on the new line was started several months ago and officials of the company recently inaugurated the new service by communicating over the wire with Arvon township officials.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

September 20: Order authorizing the Reedley Telephone Co., of Reedley, Cal., to issue sufficient shares of its capital stock of the par value of $1 per share to yield, if sold at 90, $4,780, of which amount it proposes to use $1,470.11 in the liquidation of accounts and notes due, the balance for additions and improvements to its system.

October: Application filed by Carl B. Bell and John L. Butler, of Colfax, Placer county, for permission to sell the Colfax Telephone Exchange to Mrs. S. K. Morrison of Reno, Nevada. The exchange is valued at $3,500, and Mrs. Morrison offers this amount in cash to the owners.

October: Application filed by J. A. Tower, owner of the Calaveras Telephone Co., of Felix, Cal., for permission to increase his toll rates. The present service between Angels and Felix is free to subscribers. In addition to other charges, Mr. Tower asks permission to charge 10 cents for this service.

October: Application filed by George P. Alexander for authority to build farmers telephone lines and party telephone lines in the district of Orangevale, Sacramento county. He wants to charge $1 a month for ten party service, $1.75 for five-party service, and $2.50 for two-party service. The present system, he says in his petition, is totally inadequate, and the Pacific Telephone & Telegraph Co. will co-operate with his proposed line.

DISTRICT OF COLUMBIA.

November 1: Hearing on application of the Chesapeake & Potomac Telephone Co. to have telephone service restricted to the subscriber and the agents and representatives of the subscriber.

ILLINOIS.

The Illinois Public Utilities Commission resumed work this week after having been idle for several weeks during the

absence of the commissioners at the Panama-Pacific exposition.

November 2: Hearing on application of the Peoples Telephone & Telegraph Co., of Menard county for authority to increase telephone rates at Petersburg, Athens, Oakford and Tallula.

November 2: Hearing on application of the Stronghurst Telephone Co., of Stronghurst, for certificate of convenience and necessity to erect and operate toll lines from Stronghurst through Carman.

November 2: Hearing in the case of the reorganization committee of Western Illinois Telephone Co., vs. the Prairie City Farmers' Telephone Co., relative to complaint of discrimination in regard to service and connection at Macomb and vicinity.

November 3: Hearing in the case of W. H. Bentley, Pontiac, vs. Automatic Home Telephone Co., and American Telephone & Telegraph Co., relative to petition for order requiring a physical connection at Pontiac.

November 3: Hearing on application of the Astoria Telephone Exchange for authority to increase rates at Astoria.

November 3: Hearing in the case of the Galesburg Union Telephone Co., vs. receivers Central Union Telephone Co., relative to complaint of refusal to make long distance connection at Galesburg and Knoxville.

November 3: Hearing on agreement for the purchase of the securities and stock of the Interstate Independent Telephone & Telegraph Co., Aurora, Ill., by the Atlantic & Pacific Telephone & Telegraph Co., the holding company subsidiary to the American Telephone & Telegraph Co.

November 5: Hearing in the case of the Central Illinois Light Co., vs. Fairview Telephone Co., on petition for permission to remove transformers from its Farmington-Cuba circuit at Farmington.

INDIANA.

October: Petition filed by the Indiana Hotel Co., which operates the Claypool Hotel, Indianapolis, asking that the commission order the Central Union Telephone Co. to connect its lines with the hotel system. The hotel system, which consists of about 600 lines, is at present operated by the Indianapolis Telephone Co. The Central Union, it is alleged, refuses to connect with the hotel system unless connection with the Indianapolis company is discontinued.

October 23: Linden Telephone Co., of Linden, Ind., authorized to increase its rates to $1.50 for business telephones and $1.25 for single line residence telephones.

KANSAS.

October 26: Application filed by the Missouri & Kansas Telephone Co. for an increase in rates in Wellington, Kan.

November 10: Hearing at Emporia, Kan., in the case of the Reading Mutual Telephone Co. vs. the Emporia Telephone Co. and W. W. Finney, president, in regard to service. Docket No. 945.

November 10: Hearing at Emporia, Kan., in the case of the Emporia Telephone Co. vs. the Reading Mutual Telephone Co. Docket No. 985.

November 10: Hearing at Emporia, Kan., on application of the Emporia Telephone Co. for permission to increase rates on desk sets. Docket No. 1116.

MASSACHUSETTS.

October: As a result of conferences with the Massachusetts Public Service Commission the New England Telephone & Telegraph Co. has agreed to install divided ringing on four-party suburban service lines in the Boston metropolitan district.

MICHIGAN.

October: Application filed by the Citizens Telephone Co., of Grand Rapids, for permission to market $100,000 additional in bonds for the purpose of making extensions and other improvements to its system.

MINNESOTA.

November 8: Hearing on complaint of the city council of Owatonna asking for a physical connection between the local exchange of the Northwestern Telephone Exchange Co. and the toll lines of the Tri-State Telephone & Telegraph Co., of St. Paul. In its answer to the complaint, the Tri-State company states that it is willing that such a connection be made on reasonable terms and conditions. The Northwestern company, in its answer, states that if a connection were to be ordered, it would work irreparable injury to its system and that such an order, as well as the law itself, is unconstitutional because it takes the Bell company's property without due process of law and without making any compensation therefore.

MISSOURI.

October: The commission granted permission to E. H. Huffman to sell the property of the Atlanta Telephone Co., of Atlanta, Mo., to R. M. Snow for $10,850.

December 1: Hearing on application filed by the Kansas City Southern Railway asking that the commission adopt uniform rules and regulations governing the construction and maintenance of poles, wires, cables, signal and other circuits of similar character of telephone, telegraph and railroad companies over the rights-of-way, tracks and lines of wires of railroad corporations in the state. The commission has notified all telephone, telegraph and railroad companies in the state to be represented at the hearing; that they are made parties defendant; and that they are requested to file with the commission any proposed tentative rules and regulations or suggestions relative to the terms of the proposed rules; that the commission, after a hearing, will adopt by general order uniform rules and regulations. Case No. 796.

NEW JERSEY.

October 22: Sale of the Inter-State Telephone Co. of New Jersey to the New York Telephone Co., approved; also the sale of the Paterson, Passaic & Suburban Telephone Co. to the New York Telephone Co.

October 28: Hearing at Trenton in the case of the Burlington Sewerage Co. and the Collingswood Sewerage Co. against the New York Telephone Co., in regard to alleged excessive traffic rates.

NEW YORK.

October 26: Application filed by the New York Telephone Co. for permission to establish measured service rates at its Troy, Cohoes, Watervliet and Waterford exchanges. The tentative schedule submitted by the company ranged from 600 messages at the yearly rate of $38 and five cents for every additional message to 1,800 messages at the yearly rate of $75 and three cents for each additional message; with additional messages contracted in advance at two cents, and not contracted for in advance at three cents. The present rates are $60 a year for direct business lines and $48 for two-party lines. A count of the calls in this area has recently been made under the supervision of the commission, and it has been found that the number of calls made by various users paying the same rate so varies that while some pay 17½ cents per call others get calls for as low as three-tenths of a cent.

October 29: Hearing on complaints of the board of trade of the village of Malone, subscribers on Chateaugay and Burke exchanges, and St. Lawrence County Pomona Grange against the Mountain Home Telephone Co., Adirondack Home Telephone Co. and New York Telephone Co., as to rates and service.

OHIO.

October: Application for approval of the sale of the properties of the Woodsfield Telephone Co., at $80,016; Jefferson Telephone Co., at $113,208; Belmont County Telephone Co., at $308,893; Union Telephone Co., at $308,893; Washington Telephone Co., at $164,273, to the Central District Telephone Co.

October: Petition filed by 50 farmers from near Beaver, Pike county, Ohio, urging that a certificate of public necessity be issued to them for the operation of a mutual telephone system. They allege the service given them by the company at Waverly is inadequate for their needs. The company at Waverly asked to be made a party to the application, and declared strongly it was supplying all the facilities the business that was offered or existed there required.

OKLAHOMA.

November 9: Hearing on application of the Union City Telephone Co., of Union, Okla., for an increase in rates. The company now charges $1 and $2, respectively for residence and business service and wants to advance the rates to $1.50 and $2.50.

OREGON.

October 21: Petition filed by the Apartment and Hotel Association asking that the Pacific Telephone & Telegraph Co. and the Home Telephone & Telegraph Co. be ordered to interchange service in all apartment houses and residential hotels in Portland.

VIRGINIA.

November 4: Hearing on application of the Chesapeake & Potomac Telephone Co. for permission to advance its rates on two-party line service at Newport News, Va., from $36 to $42 a year.

WISCONSIN.

November 2: Order issued directing the Elroy Telephone Co., of Elroy, Wis., to discontinue its practice of furnishing certain of its subscribers with free connections with other systems. Authority was denied the company to fix terms on which subscribers may receive long distance connections.

November 2: Application of the Boyceville Telephone Co., of Boyceville, Wis., to extend its lines into the town of Hay River, Dunn county, denied.

November 2: Jackson Telephone Co. and Anacoy Telephone Co. given permission to increase rates.

November 4: Hearing at Watertown, Wis., in regard to the application of the Lebanon Telephone Co. for authority to increase its tolls, rates and charges. U.—786.

Improvement of Long Distance Telephone Transmission

Some Suggestions for the General Improvement of Telephone Service with Special Reference to Long Distance Transmission—Report Made to the Eastern Pennsylvania Independent Telephone Association by the Chairman of the Service Committee

By C. J. Larson

In the early days of the art it was customary to base the principal comparison, covering the merits of transmission, on the outcome of a test of telephone equipment only. In other words, when the question of improved transmission was up for discussion, a number of different telephone sets would be tested out against each other and the set that proved superior in either quantity or quality, or both, was adopted.

Objections to Early Methods of Testing.

The objection to this method was that in no case was any definite standard used for comparison and, of course, as a final result, there was a wide difference of opinion among the operating men as to which manufacturing company's instrument proved the best. While the telephone test was carried out extensively, the component factor of comparative efficiency, from a transmission standpoint in central office equipment, lay dormant. For instance, comparisons of percentage of mile loss in repeating coils, cord circuits, bridge drops, relays and ringers, and last, but not least, the question of proper direct current supply regulation in cord circuits, was left largely to regulate itself.

Present-day practice has changed the former method. We now have a fixed standard known as a "Conference Standard," comprising 32 miles of standard No. 19 B. & S. gauge cable, having a loop resistance of 88 ohms per mile and a capacity of .054 mf. per mile between conductors, associated with a standard subscriber's set repeating coil and 24-volt battery at each terminal.

Having established a standard of transmission, all of the factors entering into the building up of a complete transmission connection can be compared and their equivalents determined. The following few cases, based on this principle of comparisons, showing high frequency losses to voice currents —not taking into consideration losses in current supply—will explain this statement:

	Transmission Equivalent in Miles of Standard Conference Cable.
Average wire-wound heat coil	0.500
Early type repeating coil	5.000
Subsequent improved repeating coil	2.000
Present-day repeating coil	0.500
Tinsel cords, per pair	0.030
Steel cords, per pair	0.250
1,000-ohm bridge drop	0.150
500-ohm bridge drop	0.975
200-ohm bridge drop	2.000
2 mf. condenser	0.160
No. 12 B. & S. gauge copper wire	0.122
No. 10 B. & S. gauge copper	0.085
No. 22 B. & S. gauge lead covered cable	1.600
No. 17 B. & S. gauge copper clad	1,700

In dealing with the transmission phase of telephone practice, especially with reference to long distance problems, it must be borne in mind that the losses referred to in this article enter into a completed connection and, consequently, it is of utmost importance that they be as low as possible.

Very extensive tests have proven that transmitted speech cannot be carried out commercially over more than 32 miles of standard cable. This statement, of course, refers to our unit measure, and not to commercial cable transmission, which by the application of suitable loading coils, spaced correctly, can be carried out over much greater length. With this in mind, our lines and equipment should be designed and built in such a manner that the zone radius of any two subscribers talking long distance will never manifest a loss greater than 32 miles of standard conference cable.

In order to accomplish this, careful study will have to be made of the long haul messages, even after our central office equipment has been brought up to a maximum efficiency. Certain circuit combinations that would fall within the limits for a 50-mile toll connection, will not do at all for a 100-mile connection, probably on account of the gauge of copper or the bridge coil losses, or for other reasons. The writer strongly urges the use of phantom circuits for building up long connections, as it is evident that the transmission will be superior to that on side circuits.

Three cautions may be introduced here:

First. In order to successfully operate a phantom circuit, it must be well insulated from trees, ground or elements tending to lower the insulation.

Second. Proper transposition must be cut in, or cross talk and inductive disturbances will result.

Third. High efficiency coils must be used and the fact must be borne in mind that the transmission will be as much poorer on the side circuit, after the installation of the phantom coils, as the loss of the coils manifest; in other words, if a modern half-mile coil is used, the transmission loss in terms would be as follows, before and after:

No. 10 B. & S. copper transmission equals .085; line under discussion 350 miles long.

350 times .085 equals 29.75, before phantom installation.

2 times ½ plus 29.75 equals ?0.75, after phantom installation.

Attention is also directed to the circuits used in toll boards. In some cases the writer has observed that the direct current supply to a subscriber's loop was less on a connection set up through the toll board than when connected through the local board, this change in current supply being brought about by circuit application necessary to attain supervision and other features incident to service trunk operation. That such a method is decidedly wrong must be evident.

A recent test made by the writer, varying the current supply in the subscriber's loop from 68 to 150 milliamperes, resulted in a gain of 50 per cent. in transmission, the test being conducted over 150 miles of toll lines.

Method of Feeding Battery in P. B. X.

Special attention is called to the method of feeding battery in private branch exchanges. I have observed in a number of cases that a call which required central office switching received its battery supply from the A board operator's cord circuit, while the battery for a local connection was taken from a small set of storage cells located at the P. B. X.

A study of this condition will disclose the following: On an established toll call to a private branch exchange subscriber, central office trunking will, of course, be a necessity. If the exchange trunks are of average length, invariably, the transmitter of the subscriber talking long distance, connected up in this manner, will receive less current than when he is talking to a local subscriber connected up within his own private branch exchange zone. Where this condition exists, a remarkable gain can be made by the rearrangement of the trunk circuits so as to take the battery in all cases direct from the P. B. X. source of supply.

A word of caution is also directed to the use of steel cords in toll boards, although I think it is generally agreed upon, that for toll line transmission the steel cord has no application whatever.

The use of condensers of low capacity on cord circuits, to obtain a non-ring-through feature, and where these condensers enter into the talking circuit, is also to be discouraged. Likewise, there is no necessity for a double clearing-out drop with condensers interposed between them on through toll cord circuits, although the writer knows that that is considered a standard circuit by some operating companies.

The controlling element to this entire problem of transmission is to eliminate any series resistance or impedance as well as any loss due to the application of bridged resistances. Consequently, it follows that the closer we adhere to this Golden Rule, the better will be our transmission.

When comparing the value of bridged coils, whether they be drops bridged across in and out jacks or clearing out signals, the effective resistance to voice currents, and not the ohmic resistance, is to be considered. It is possible for a 1,000-ohm drop to manifest a greater loss to voice current than a 250-ohm drop, the difference being due to the structural condition of the two drops. However, the construction remaining the same, the higher the resistance, the higher the impedance and, of course, the less the loss.

A few words on the subject of repeating coils will not be amiss. No matter how efficient this particular unit is, its presence is bound to cause, as has been explained, some loss. When the fact is considered that it is quite likely for a toll connection to be set up of a number of inter-linking lines, probably going through a half dozen or more offices, it is evident that if each office switched this line through on a pair of repeating coil cords, the sum total in loss incident to the repeating coils only, would be considerable.

This means that careful judgment on the part of the operators and a thorough knowledge of the proper application of when to use repeating coils and when not to, must be exercised. It is, of course, evident that where an operator has learned that two toll circuits are quiet, but upon connecting them together, a noisy connection results, the presence of a repeating coil will have a tendency of reducing the disturbing element and rendering a quiet circuit. In this case, as in the case of where a toll call originates or terminates in a common battery exchange, the repeating coil has a proper application.

Activities of the Service Committee.

Through the combined efforts of the members of the service committee, we are endeavoring to improve long distance transmission over our lines.

A large amount of work has been done. The high resistance heat coils have been removed from our toll line equipment, modern high efficiency repeating coils have replaced the early type and where through toll connections are set up, the loss incident to bridge impedance has been reduced considerably.

Inspection of toll lines, by members of the committee, has been made and where conditions required attention, the company was notified. In this connection I wish to say that prompt action usually followed the suggestions made by the committee.

While the improvements attained, I believe, show themselves, this work is just begun, and it will be necessary to carefully grade all of the toll lines, give them a numerical prefix and determine the transmission constant of all of these circuits so as to enable our toll operators to know what circuits are to be used to connect to given points and still be within the permissible transmission limits.

This will call for a lot of field work, but when the information is obtained, and our toll business routed in a scientific manner from a standpoint of efficiency, rather than with a view of hauling a message over as much of the originating company's territory, regardless of consequences, we will have made a start in a direction that will be bound to bring results and increased revenue.

It will be of interest to note that the western part of the state, under the capable direction of Mr. Hay, service engineer, is working along the same direction as the eastern part; also that the Standardization Committee of the Independent Telephone Association of America, of which the writer is a member, together with the manufacturers, are at the present moment at work on what will mark an epoch in Independent telephone practice, namely, the standardization of equipment, values of current supply and other factors which are now a handicap to Independent telephone service.

Meeting of Eastern Pennsylvania Association.

At the convention of the Eastern Pennsylvania Independent Telephone Association, held at York, Pa., October 21, it was decided to employ a service engineer for the territory covered by the association. As this was the semi-annual meeting there was no set program. Uniform local and long distance operating rules and instructions were discussed at some length.

Among the companies represented were the following: Keystone Telephone Co., of Philadelphia, J. F. Stockwell, operating manager; Consolidated Telephone Co., Hazleton, Edward M. Prisk, general manager; United Telephone Co., W. B. McCaleb, receiver, and Charles A. Carl, general manager; Cumberland Valley Telephone Co., Henry M. Tracy, receiver, and Cameron L. Baer, operating manager; York Telephone & Telegraph Co., George B. Rudy, general manager; Columbia Telephone Co., H. A. Oberdorf, general manager; Kellogg Switchboard & Supply Co., C. M. Thompson, Pennsylvania representative; Garford Mfg. Co., represented by R. Davis, Philadelphia; Century Telephone Construction Co., W. W. Kidney, general manager; Eastern Pennsylvania Traffic Association, H. E. Bradley, secretary.

Long Distance Operators' Meeting at Jamestown, N. Y.

A school for long distance operators was held by the Western Pennsylvania Independent Telephone Association at Jamestown, N. Y., October 27 and 28. This is one of a series of meetings which are being conducted in various sections of western Pennsylvania and western New York for the purpose of introducing and explaining the new set of operating rules of the Ohio State Telephone Co., which the association has adopted. W. H. Hay, of Pittsburgh, service engineer of the association, is in charge of the meetings.

Since September 1 schools have been conducted at New Castle, Butler, Oil City, Erie, California, Uniontown, Johnstown, Clearfield, Kittanning, Brookville, and Ridgway, in Pennsylvania, and in Geneva, Hornell and Jamestown, in New York state.

Telephone Company to Educate Office Boys.

A school for boys, probably the first of its kind, to educate them for higher positions, was opened recently in Chicago, by the Chicago Telephone Co., under the direction of H. F. Hill, vice-president of the company. The new school opened with an attendance of 120 boys, ranging in age from 15 to 18. The books were provided by the company and the Y. M. C. A. supplied the instructors.

"The problem of the office boy who has become too old for his job has puzzled us," said Mr. Hill. "We believe good results can be obtained by educating them, so that they may work into better positions."

Classes will meet every Tuesday, Thursday and Friday from 12 o'clock until 2. During these hours the "bosses" will have to get along as best they may, Mr. Hill said.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25 Part III, Telephone Accounting and Auditing, Written by James H. Shoemaker

Quiz Questions on the Preceding Installment.

27. State a reason for keeping separate accounts.

28. What two facts regarding the keeping of separate accounts were revealed as a result of experience?

29. What was the natural result of the keeping of separate accounts?

30. Name the five groups of telephone accounts as prescribed by the Interstate Commerce Commission.

31. State one of the main purposes of the balance sheet group.

32. What was the basis of the argument used by a telephone manager when seeking an increase of the credit already extended his company by a bank?

33. State some reasons why telephone companies should enjoy good credit.

34. What two points are brought out by the manager's experience with the banker?

35. How many groups of balance sheet accounts are required by the Interstate Commerce Commission?

CHAPTER III. The Groups of Accounts (Cont'd).

36. *The Plant and Equipment Group.*—As the capital and surplus is the item of first importance to the shareholders and depositors of a bank, so the plant and equipment is the item of first importance to the shareholders of a telephone undertaking. The instructions of the Interstate Commerce Commission to Class C companies say:

"The Plant and Equipment Account (as it appears on the balance sheet) shall include the cost of all property, tangible and intangible, used by the company in its telephone operations and operations incident thereto, at the date for which the balance sheet is made."

The balance sheet total of plant and equipment is divided into ten sub-accounts (in the plant and equipment group) as follows:

200. Intangibles.
210. Land and buildings.
220. Central office equipment.
230. Station equipment.
240. Exchange lines.
250. Toll lines.
260. General equipment.
270. Undistributed construction account.
280. Plant and equipment purchased.
290. Plant and equipment in service, January 1, 1915.

On page 21, of instructions of the Interstate Commerce Commission's "Uniform System" for Class C companies, is given a complete detail of the manner in which entries shall be made under each of these accounts.

37. *Sources of a Telephone Company's Funds.*—The sources of funds which come into the treasury of a company may be classified as:

(a). From the sale of capital stock.

(b). From the sale of bonds.

(c). From the *sale* of notes—for, in effect, that is what it means. A note is *sold* when it is delivered in exchange for a credit, at the bank or elsewhere; and it is bought back when the bank or creditor gives it back—cancelled.

Now, all such sources of income are plainly different from income that is earned. Hence before a correct knowledge of the earnings and expenses of a telephone business can be had, there must be a separation of the earnings income from the investment income. The figures covering the amounts received for stock, bonds, notes, etc., must be separated from the amounts received for service.

38. *The Income Accounts Group.*—To accomplish this end, a group of accounts, called "Income Accounts," has been arranged. It should be understood that while this group is *called* "Income Accounts," it covers outgo as well as income. It is important that the reader understand, also, that it does *not* include all the items of income; nor does it include every item of outgo. It is limited strictly to operating income (operating revenues) and operating outgo (operating expenses) of the company.

It is well to get clearly in mind, also, the reason why there should be a group of "Income Accounts" which includes only a part of the income and outgo of funds or credits.

39. *Income Accounts Distinguished from Other Accounts.*—In the mind of everyone who has anything whatever to do with utility accounting under commission control, three things need to be thought through to the point where they stand out like three great mountain peaks. They are as follows:

First. Every income is, in the main, either from an investor and therefore an investment; or from service rendered and, therefore, an earning—an "operating revenue."

Second. Every outgo, every expenditure, in the main, is either for the extension of the property, by reason of which it becomes an investment in the form of plant or equipment; or it is for the supplying of service, by reason of which it becomes an expense—an "operating expense."

Third. It will make matters more clear, we think, if this point is kept clearly in mind: The so-called "Income Account" is for the one great purpose of keeping the "Operating Revenue" and the operating expenditures ("Operating Expenses") clearly, accurately and completely separated from any and every other item of income and outgo.

40. *The Income Accounts.*—As prescribed for Class C companies, the income accounts are:

Credits	Debits
300. Telephone operating revenues.	300. Telephone operating expenses.
310. Other operating revenues.	340. Other operating expenses.
320. Miscellaneous income.	350. Taxes.
	360. Interest accrued.
	370. Miscellaneous charges to income.
	380. Dividends declared.

It will be helpful, also, perhaps, if one will fix with equal clearness in mind this important point: The miscellaneous credits to income (item 320) do *not* mean income from any of the *investment* sources. This may be seen by referring to

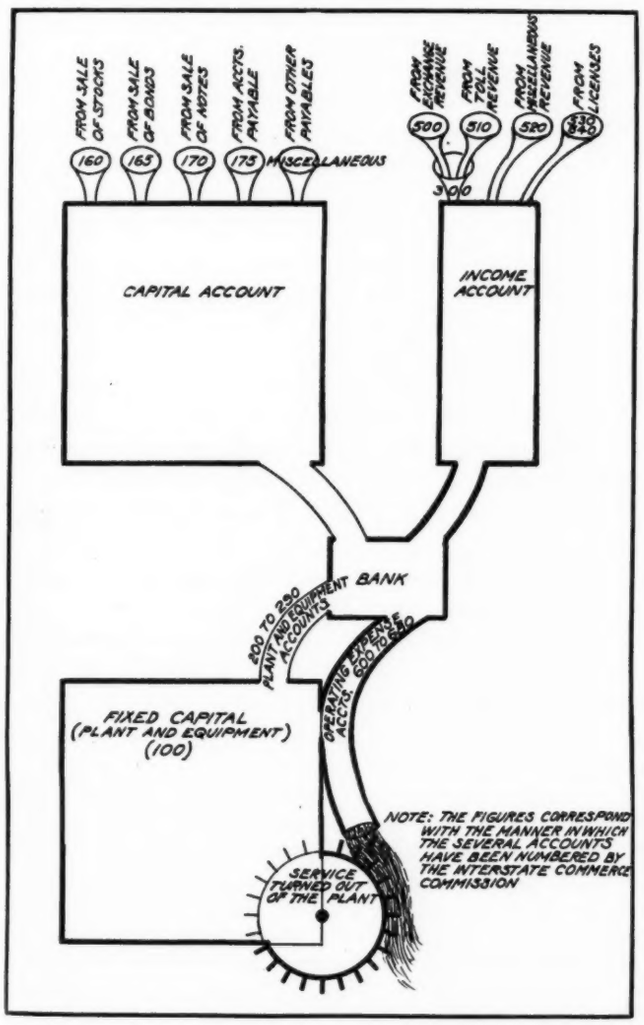


Fig. 3. Relationship Between Capital Account, Income Account, Bank, Plant and Cost of Operation.

page 23 of the instructions previously mentioned, which distinctly say:

This account shall include (as credits): (a). Interest *receivable from others* on mortgages, bonds, notes, etc., which one's company may own. (b). Dividends receivable from other companies on stocks, bonds or other securities which one's company may own. (c). Rents received from plant leased to others and not used in part by one's own company (but owned by it) such as an entire leased exchange system, an important section of pole lines, etc. (d). Other *similar* items of income. (e) Charge to this account (place on the debit side) any expenses incurred that are directly assignable to the revenues which are credited to this account such as expense of maintenance of plant leased to others, expense of procuring interest and dividends, and similar charges.

Before leaving this group it may be as well to quote what the instructions say concerning item 370, which is scheduled as "Miscellaneous" under Income Account Debits.

This account shall include: (a). Rents payable for plant and equipment leased (by one's own company from others), such as an entire exchange system, an important section of pole lines, etc., but not including minor rents which are provided for in account 680. (b). Losses not properly chargeable as operating expenses. (c). Uncollectible bills. (d). Other *similar* items. (See page 24 of the pamphlet of instructions.)

41. *The Operating Revenue Group.*—As required by the Interstate Commerce Commission, the operating revenue accounts are five in number, as follows:

500. Exchange revenues.
510. Toll revenues.
520. Miscellaneous revenues.
530. License revenues—Cr.
540. License revenues—Dr.

Inasmuch as this group of accounts takes in more than nine-tenths of all the entries that the average telephone company usually has to make, it will be well for every student of the subject of telephone accounting to read and re-read every word on page 25 and 26 of the Interstate commission's instructions to Class C companies.

It will be well, also, to get as clearly in mind as possible that it is the purpose of this group to keep the toll receipts separated from the receipts or earnings which accrue from exchange service.

42. *The Operating Expense Group.*—There are nine subaccounts in the operating expense group. They are:

600. Repairs of wire plant.
610. Repairs of equipment.
620. Station removals and changes.
630. Depreciation of plant and equipment.
640. Other maintenance expenses.
650. Operators' wages.
660. Other traffic expenses.
670. General office salaries.
680. Other general expenses.

Here we come upon the group of accounts in which more than nine-tenths of the average company's items of outgo must be entered. In other words, the operating revenue group and the operating expense group constitute *the big end of the game* of telephone accounting.

43. *The Accounting Scheme as a Whole.*—But before taking up, in more minute detail, the departments of revenue and expense accounting, let some further consideration be given to the accounting scheme as a whole. Some who claim to have tested the matter, tell us that, if one tries to point out a house to a child, in a majority of cases the child will fail to observe the house at all. It will fix its attention upon some small part, such as the chimney, a window, a door, or, possibly a porch or entrance stairway. In a like manner, it is possible to so firmly fix our attention upon the revenue and expense groups of telephone accounting as to lose all true sense of the proportion of the accounting scheme as a whole.

At the convention of telephone managers, to which reference was made in Chapter I, there was a loud demand for better forms for work report blanks, and for forms which would better accommodate the work of accounting for materials used. Attention will be given, later, to those very important matters. But let us avoid looking at the chimney, the stair-

way, or the door, until we have obtained a better view of our structure as a whole.

44. *The Numbering of the Accounts.*—The reader will observe that in numbering the several accounts, the Interstate Commerce Commission has jumped, for instance, from 100 to 105 at the beginning of the balance sheet group. In the instructions which the commission issued for the guidance of companies "having annual revenues exceeding $50,000," the item numbered 100 is for "Fixed Capital, installed prior to January 1, 1913"; and item 101 is for "Fixed Capital, installed since December 31, 1912." Those instructions were issued—to the Class A companies—under date of January 1, 1913, while the pamphlet which contains the instructions for uniform accounting for Class C companies is dated October 13, 1914, and did not become effective until January 1, 1915.

Attention is called to the foregoing for two reasons: First. It is well to know the full significance of the scheme of numbering, and that it is the intention to have certain of the totals of the smaller companies harmonize—in the general accounting scheme—with corresponding totals of the larger companies, even though there are many more subdivisions in the accounting practices of the latter than of the former.

Second. The terms "Capital account" and "Fixed capital," shown in Fig. 3, are used more or less frequently by telephone accountants, and it is well to be familiar with the origin and nature of such usage as is here indicated.

45. *Interwoven Relationship of Accounts.*—The object of the illustration, Fig. 3, is to make as plain as possible the average proportion of the year's income to the capital account, on the one hand, and to the plant and equipment cost, on the other.

From a graphic point of view, the amount of space (or the proportions) of the income account rectangle is only one-third that of the capital account square. If the reader's company is fortunate enough to be realizing an income greater than 33⅓ per cent. of its plant cost, he should enlarge the proportions of the income area in the illustration. In all probability, however, very few will need to do that, for there are not many companies so favorably circumstanced as to receive an amount equal to one-third of their plant cost, in service revenues each year.

If it is desired to obtain a better realization of the difference between the ratio of fixed capital to income in the telephone business, on one side, and the corresponding ratio in Mr. Ford's automobile undertaking, on the other, just reverse the relative sizes—to the opposite extreme from what they are in Fig. 3. The author does not know the amount of the total sales of Mr. Ford's plant, but the profits can not exceed the sales (or operating revenues). And when profits are reported sufficient to pay for a five-fold increase in the paid-up capital, it is plain that the income account must have been from ten to twenty times as large as the former fixed capital account.

In the opinion of the writer, too many owners and managers neglect to fix in their own minds this matter of the ratio or proportion of income to fixed capital. A much greater number fail to fix in the minds of their accountants, a proper sense of the proportions of these two accounts—or of the importance of the three-fold larger one. Attending to ninety-nine entries in the smaller account is apt to make the bookkeeper forget that he has another account in which one entry out of each hundred or thousand is made.

Entirely aside from the largeness or smallness of the amounts of these accounts, Fig. 3 is intended, in the second place, to show the interwoven relationship of the following items:

I. Capital account.
II. Plant and equipment (fixed capital).
III. Income account (operating revenues, *principally*).
IV. Operation (cost of operating or "Operating expense").
V. Bank (or cash account).

46. *The Cash Account.*—Attention is called, more particularly to these points:

(a). All income goes through the same "Bank" or cash account, the income from capital account as well as the income from "Income account" or operation.

(b). Both operating expense funds and "Fixed capital" expenditures come out of this same "Bank" or cash account. In other words all income, from whatever source, becomes "liquid," each different kind mixing with all the others when it is entered in the cash account or deposited in the bank. Just as the owner of wheat receives a storage certificate for so many bushels and later gets back a corresponding number of bushels but does not get, nor does he expect to get back the identical grain which he stored, so the cash account or "Bank" is a storage place in which every penny loses its identity.

On the other hand, when funds are expended from this common reservoir, the accountant must be informed, and he must complete his records in such manner as to show:

1. Whether the outgo was for fixed capital (plant and equipment), or for operation expense.

2. Whether the expenses of operation consumes all of the operating income.

3. What is done about the deficit or surplus as between the income from operation and the outgo for the same. In what manner, if at all, the deficit, if any, is made up. Or, if there is a net gain from the operation of the plant, what portion goes to dividends and what portion to surplus.

(*To be Continued.*)

Operators' School at Fort Wayne, Ind.

A very successful and highly instructive operators' meeting was held at Fort Wayne, Ind., October 28. It was arranged by the Northeastern Indiana Telephone Association, which includes the Independent telephone companies in Steuben, LaGrange, Noble, DeKalb, Allen, Whitley, Huntington, Adams and Wells counties, Ind., and Van Wert, Paulding, William and Defiance counties, Ohio.

F. V. Newman, secretary of the Michigan Independent Telephone & Traffic Association, Grand Rapids, Mich., conducted the sessions, both in the forenoon and afternoon, taking the Ohio State Telephone Co.'s new book of rules as the basis of instruction. Thirty-seven exchanges were represented with a total of close to 100 operators in attendance.

In addition to the operators' school a meeting was held in the afternoon by the exchange managers and their help, which was conducted by John A. Harrison, telephone engineer, of Lima, Ohio. This proved a very interesting and profitable meeting. The discussions were along the line of proper installation and maintenance of equipment and apparatus. It is the intention of the association to hold several schools and meetings of this kind during the year.

Practical Subjects—Letters and Discussions

The Spillway Test—How and for What Used.

The spillway test, so-called, is a test to locate the point at which a line wire is broken, says E. S. Beebe, New London, Conn., in The Telephone Bulletin. When using this test only two arms of the bridge are used as shown by the diagram.

The battery of alternating current, made so by use of a relay, will pass out of the arm, *A*, of the bridge and onto the line or cable which is to be spilled. This battery will also pass through the variable arm, *V*, of the bridge through the condenser to ground. There is a relay which reverses the galvanometer with each reversal of the battery. If this were not done, the galvanometer needle would vibrate rapidly back and forth so that it would be very difficult to get a balance.

For the sake of illustration, we will assume that we have a line between New Haven and Hartford which shows open and that the New Haven toll wire chief is going to make a spill of the line to determine the location of the break.

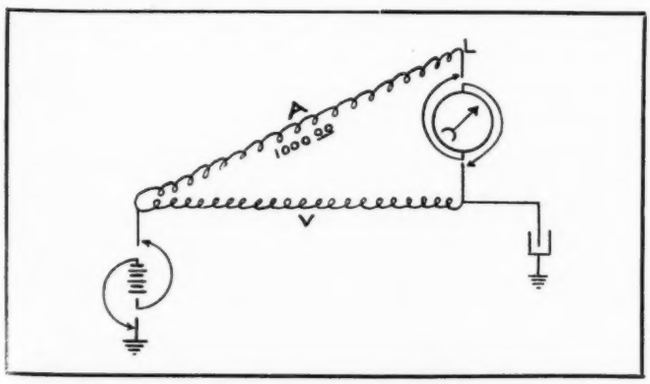
The wire would be opened on the Hartford test board to clear it of any central office apparatus which might throw off the test. We would next connect the point with the good side of the pair. Then the variable arm, *V*, of the bridge would be set at zero ohms. The needle, or dial, of the galvanometer would swing solidly to the right, for current is flowing through the zero resistance of the variable arm, through the galvanometer and out onto the line, which is now considered as one side of a condenser, and the earth and nearby wires as the other side of the condenser, with the insulators on the line, the air and paper cover of the wires in the cables as the insulating material.

We now turn up the variable resistance until it reads 800. The galvanometer needle swings to the left of the center showing that the path of least resistance is through the arm *A* galvanometer, condenser, to ground.

We turn the variable arm back to 790 and the needle again swings to the right, showing that the balance is between 790 and 800. By adjusting the resistance we find that the needle comes to rest in the center of the scale, indicating that no current is flowing through the galvanometer at 795 ohms. Thus 795 is the spill of the good wire.

Upon spilling the bad wire we find that the galvanometer comes to rest in the center of the scale at 450.

Upon a previous occasion it was found that the cable on the New Haven end of the line spilled 100 and the Hartford cable 95. Deducting 195, the spill of both cables, from 795, the spill of the good wire, we have left 600 which must be the spill

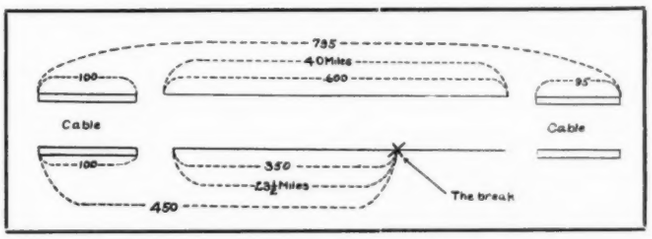


Galvanometer Connections for Spillway Test.

of the good aerial wire from the New Haven cable box to the Hartford cable box.

Deducting 100, the spill of the New Haven cable, from 450, the spill of the bad wire, we have 350 left or the spill of the bad wire from the New Haven cable box to the break.

In order to determine the number of units or spills per mile on any line at any given time, it is necessary to divide the number of spills into the distance, which in this case is 40 miles divided into 600 spills. This gives us 15 units or spills per mile. Now, if it is 15 units per mile, it must be as many



Determination of Spills of the Good and Bad Wires.

miles to the trouble as 15 is contained in 350 or 23½ miles.

If this test is carefully made, there should be little difference between the theoretical and actual location of the trouble. As a matter of fact, in experience it has proven to be as accurate for the location of the opens as the varley loop is for the location of grounds and crosses.

Some Service and Tree-Trimming Experiences.

I had the blissful experience of being placed in charge of a small exchange, one of a number of small ones belonging to the same company. This one in particular had been operated, or had operated *alone* mostly, until most of its patrons had refused to pay any more on account of the service. I was expected to take one man and put this in shape, and what shape it was in!

To begin with, the office was not fit for a good respectable hog pen, to say nothing of being fit for any decent girl to work in—I could not. The switchboard was of 200 lines and was built special for what, no one seemed to know. But there was enough wire in it for at least two up-to-date boards. The plugs, cords and jacks were worn out, but the manager was supposed to make new ones nights and Sundays, and on his munificent salary of $60 per month he had no reason to complain. In town the wires were so rusty they would hardly stay in the air. On the farmer lines the wires were nailed to fence posts, hung on bushes, or laid in the grass. The telephones were good in their day, but that day had passed for most of them.

It was coming winter and a good time to make a showing. Do you know, for all this wretched condition, and I working my fool head off, the first shot out of the box was a call-down from the general manager because I was wanting something to work with? Did I tell him something? I tried to. It's a mighty nice job to sit in an office with a stenographer at your elbow and dictate a dirty slur of a letter to a poor fellow who is up against it for material and for not having any backing in putting his exchange in shape so he can collect. It's a lovely thing to be born to command, but put yourself in the other fellow's place a few minutes once in a while and see if you don't look like 35 cents. Give 100 *per cent. service* a little while and you won't have to use so much energy on "Collections."

I am also interested in several articles that have appeared of late on "Guying to Trees." Now, every telephone or electric light or any man having to do with poles, knows a tree is no place for a guy wire, but, in many cases there seems to be no other resort.

In such cases a block—a small pole cut off the right length and split in the middle—should be placed in a crotch of the tree. The next resort is placing the guy about the tree with

blocks between the tree and the guy wire. Under no circumstances should the guy go completely around the tree unless it be temporary work. Right here, beware of the foreman or lineman who comes along and tells you it is but a temporary job, for it generally stays on.

When I say a block in a tree, I do not mean an old ten-pin cross arm with part of the pins sticking out. I have seen this work done and it makes me tired. And it makes me more tired and mad to see a lineman get into a farmer's tree, or one belonging to any person, with a dull hand axe and do what he calls with pride and a sickly grin, a 20-year job of trimming. Yes, I said a farmer's tree, not a tree on Millionaire's Row, though it could apply here as well. Why is it that heads of telephone or any companies using poles along a city or a country right of way, seem to think that all farmers are fools and have no pride?

Take this tree business home to yourselves and be decent lest someone use a shotgun in defense of his just rights. I am a telephone man, but I am ashamed of some work done under this name and sometimes brains are about as essential as are some bulletins which are written for our education.

Theory is beautiful, but it's a pity that someone with no practical experience or without the least spark of common sense, has to deliberately spoil it. One Who Knows.

Power Line Protective Devices Saved Telephone Cable.

In a paper "Interference from Single-Phase High Tension Lines of the N. Y., N. H. & H. R. R. Co.," presented at the annual convention of the Association of Railway Telegraph Superintendents at Rochester, N. Y., last June, N. E. Smith, superintendent of telegraph of that railroad, relates an interesting occurrence.

Between Harlem River and Pelham Bay, on the Harlem River branch, a distance of seven miles, we have several very large and important freight stations and yards. On account of the catenary construction on the electric system, occupying a great portion of the railroad right-of-way, we were obliged to substitute for the open telephone wires, serving those particular localities, a lead sheath cable. This cable contained No. 13 and No. 19 gauge, double paper insulated, twisted pair conductors. It was suspended by means of marlin clips from a messenger wire bolted to the catenary bridges.

The cable sheath was bonded to the steel work at every other bridge or practically every 600 feet. Type Y-109 General Electric insulating transformers, were installed between the lines and telephones, and also at Harlem River, on lines entering our P. B. X. at that point. Although the cable, which has now been in service three years, is located at an average distance of ten or twelve feet from the 11,000-volt wires, no effects from induction have ever been noted. We have had, during that time, but two cable failures, both of which were the result of rifle practice on the part of some one maliciously inclined.

This cable carries about 20 magneto working circuits with which are connected about 50 telephones. Transmission is somewhat reduced by the telephone insulating transformers and the capacity of the cable, but the service, as a whole, is entirely satisfactory, and long distance connections are frequently established successfully.

One incident, in connection with this cable, may be of more than ordinary interest. For a long time, we were quite well satisfied that, should an actual contact take place between a 11,000-volt wire and the lead sheath, hardly anything would be left of the cable, as a result. Just such an accident as this occurred a few months ago. While a change in location of this cable was being made, it accidentally dropped directly upon some 11,000-volt wires underneath, which were connected with an auto-transformer, with the surprising result that the circuit breakers of the electric system in the Harlem yards instantly opened.

The only evidence of a contact, so far as the cable was concerned, was an abrasion of the lead sheath, where it struck the high tension wires. The telephone service was not interrupted, as no cable conductors were affected. Evidently, the bonding of the lead sheath to the steel work, and the low resistance and carrying capacity of the sheath, assisted in affording protection sufficient to prevent damage.

Modern Methods of Distributing Telephone Directories.

Delivering a new issue of a telephone directory is always more or less worry on the part of the exchange manager and every scheme for a quick, accurate and honest delivery has been tried. So often people who deliver directories are careless, or deliberately dishonest in delivering the books. Sometimes the books go into convenient waste barrels or sewer openings instead of being delivered to the subscriber.

Eugene B. Kemp, manager of the Ithaca, N. Y., exchange of the Federal Telephone & Telegraph Co., states that he has tried several plans, but the one used for the June directory proved more satisfactory than any he has tried before or read about. He arranged with the man in charge of the carrier boys for the Ithaca Daily News, to take the job for the complete delivery of all books within the territory covered by the newspaper routes. A price of one cent per book was agreed upon for the territory covered by the carrier boys and three cents per book for subscribers beyond the newspaper routes.

A complete list of all subscribers was made according to streets; separate sheets were used for each street, even if there were only one subscriber on a street. Some of the long streets were arranged on two sheets; odd numbers on one sheet and even numbers on another.

The manager of the carrier boys assorted the sheets according to his newspaper routes, and those sheets were given to the same carrier who delivered papers on that route. In that way the boys were familiar with the names, location and short cuts on the street. The carriers were given from five to ten extra books for subscribers who have extension telephones.

The number of books given each boy was recorded by the bookkeeper of the Ithaca exchange, and when the boys returned the undelivered books, or returned for more books, they were credited for the number delivered. The boys were told by Manager Kemp that he would call each subscriber to ascertain if they received a June directory before they would be paid.

After calling all subscribers he found that less than a hundred said they did not receive a book. When a "pick up" boy carried books to those who said they did not receive a June book he found that most of them did get the book, but misunderstood the person calling.

About 2,300 books were delivered. Over 90 per cent. were delivered by the carrier boys in less than five hours. Less than 50 subscribers were missed, either from not being on the list, overlooked by the boys or no one at home. The boys were instructed not to leave books if no one answered the bell.

No effort was made to collect the old books because it would put a drag on the delivery, but the boys, and the person calling were instructed to ask the subscriber to destroy the December book, so no trouble was experienced by people using the old books. The cost of delivery, Manager Kemp states, was about half what the December issue cost.

Telephone System of Lehigh Valley Railroad.

"Telephone to the man you want in the Lehigh Valley Railroad" is the title of a leaflet which the Lehigh Valley Railroad Co. has just issued for the convenience of those doing business over the telephone with its offices in New York. It is arranged in such an attractive form that even though a person is too busy to read the three short pages containing the explanatory text, he may, by glancing at the headlines, get a pretty good insight into the size of the

telephone system required to keep one big railroad in touch with its patrons in the vicinity of New York. The general executive offices, the freight, the passenger and the baggage departments, all have their separate telephones converging at the central office.

On the last page of the leaflet there is a concise telephone directory showing all the offices of the Lehigh Valley Railroad in the entire metropolitan district.

Unfair Competition in Telephone Business.

Will you kindly publish in the columns of TELEPHONY as to whether or not there is a federal law against a telephone company openly furnishing free telephone service to citizens and business concerns. The Bell company at this point has for years been very much in the minority. It has been, and is still, offering free telephones to merchants to allow it to install its telephones in their business houses and residences, while on the other hand, quite a few are compelled to pay from $1 to $2.25 per month for their telephones.

Could not this be termed, "Discrimination in an effort to destroy competition" which we, understanding the situation as we do, realize is the case. Any information you may be able to furnish us will be greatly appreciated.

The Federal Trade Commission Act which became effective September 26, 1914, in Section 5 says:

"That unfair methods of competition in commerce are hereby declared unlawful. The commission is hereby empowered and directed to prevent persons, partnerships or corporations, except banks, and common carriers subject to the act to regulate commerce, from using unfair methods of competition in commerce."

Telephone companies are evidently, under this section, excluded; also it is a question as to whether the word "commerce" would include the business transacted by the company. The definition of commerce as given in the act "means commerce among the several states or foreign nations or any territory of the United States or in the District of Columbia, or between any such territory and another or between any such territory and any state or foreign nation. . . . ."

In the Federal anti-trust act known as the Clayton act, which became effective October 15, 1914, it is stated:

"Commerce as used herein means trade or commerce among the several states and with foreign nations or between the District of Columbia or any territory of the United States and any state, territory or foreign nation. . . . ."

"The word 'person or persons' wherever used in this act shall be deemed to include corporations and associations existing under or authorized by the laws of either the United States, the laws of any of the territories, the laws of any state, or the laws of any foreign country."

In section 2 of this act it is stated:

"That it shall be unlawful for any person engaged in commerce in the course of such commerce either directly or indirectly to discriminate in price between different purchasers of commodities which commodities are sold for use, consumption or resale within the United States . . . . where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly in any line of commerce."

Section 4 states: "That any person who shall be injured in his business or property by reason of anything forbidden in the anti-trust laws may sue therefore in any district court of the United States in which the defendant resides or is found or has an agent, without respect to the amount in controversy, and shall recover three-fold the damages sustained by him and the cost of the suit, including a reasonable attorney's fee."

An important indication of the attitude of federal courts on what constitutes unfair methods of competition appears in a decree recently handed down by Judge Anderson of the United States District Court of Indiana. This was in an action by the United States vs. S. F. Bowser & Co., Inc., et al. The company and several individual defendants consented to a decree without defending the suit. The court, therefore, on motion of the government, decreed that the defendants were engaged in a combination to restrain and in an attempt to monopolize interstate trade and commerce in violation of the Sherman law, and enjoined them among other things:

"From reducing the prices of pumps, tanks or outfits below the cost of production, or giving them away, in order to prevent sale by competitors; or discriminating in prices between different persons or localities with the purpose of intent thereby to destroy or injure the business of a competitor.

"From securing or attempting to secure or bring about in any manner the cancellation of orders taken or sales made by competitors, or interfering in any way with contracts entered into by competitors with purchasers of their pumps, tanks or outfits."

While this decree makes no reference to the federal trade commission law or the Clayton act, it is perhaps a significant step in the building up of a definition of the term "Unfair methods of competition" which appears but is not defined in these laws.

Cumberland Valley Plays Important Part in Parade.

The float of the telephone company at Hanover, Pa., in the business men's parade, as shown below, was pronounced one of the most attractive in the parade. The exchange at

DO YOU KNOW THE FIRST INDEPENDENT TELEPHONE CO. IN PENNSYLVANIA WAS ORGANIZED IN HANOVER?
CUMBERLAND VALLEY TELEPHONE CO.

Telephone Float in Business Men's Parade at Hanover, Pa.

Hanover is operated by the Cumberland Valley Telephone Co., whose headquarters are at Harrisburg, Pa. It will be interesting to note that the Hanover Telephone Co., at Hanover, Pa., was the first Independent telephone company organized and the first exchange put in operation in the state of Pennsylvania.

The switchboard and equipment shown on the float are a product of the Garford Mfg. Co., Elyria, Ohio, which include the small P. B. X. board shown, as well as the desk stand telephones.

New Telephone Line in Wyoming Completed.

The telephone line between Big Horn and Penrose Park, Wyo., constructed by and for the use of the Big Horn national forest, has been completed and put into operation. The new line connects with the old government line to Dome Lake and Bald Mountain at a point about four miles west of Big Horn and is 13 miles in length.

It gives direct telephone communication between Sheridan and the ranger station at Penrose Park, the center of an immense district which has hitherto been without telephonic communication. The line is expected to prove very valuable in the work of the fire guards, and will also prove a convenience for campers and others in the mountains.

Queries on Theory and Practice

Testing and Repairing Polarized Ringers.

What are the means of testing and repairing polarized ringers?

Telephone bells ring on various current strengths. Straight line, non-biased bells, 1,000 to 1,600 ohms, should ring on 0.005 to 0.010 ampere. Harmonic bells require from 0.015 to 0.030 ampere. Accurate tests can not be made without instruments for there are too many uncertain factors. Rough tests can be made by arranging in your shop a duplicate of your worst line condition and testing your bells through it, using current from your ringing generator. Then you know they will ring anywhere on your plant.

It is not enough, however, to arrange to test the bell on its weakest current. You should also test it on the strongest current which it will receive. A bell whose magnet is weak may ring well on weak current and stick on heavy current.

Minor repairs can be made by the local shop without specific directions. This includes rewinding burned-out coils, taking care to use the same size of wire and number of turns as used before. Repairs of a more serious nature should be referred to the maker of the bell. This includes such things as weak polarizing magnets. Reputable manufacturers will make good on such defects.

Circuit for Testing.

In connection with the circuit for testing, as given in TELEPHONY of October 23 under "Queries on Theory and Practice," I would like to make a suggestion:

The circuit answers the requirements mentioned, but my suggestion is that the telephone key be connected in the circuit between the grounding key and the voltmeter and battery, making it possible to listen and ring, as well as test with the voltmeter from either side of the line to ground. These latter tests are often of as much value as the voltmeter test in locating trouble. Also for a magneto exchange where a telephone and not an operator's circuit on a switchboard is connected to the talking key, a separate ringing key would not be required, as the telephone would answer both for talking and ringing. You would have, therefore, only the three keys,—telephone, ground and reverse.

I have made considerable use of just such a circuit as mentioned, and have found it to be eminently satisfactory.

Portland, Ore. D. R. Middleton.

Connecting Lines with Automatic Switch.

Our system is composed chiefly of grounded rural lines ranging in length from five to twelve miles. We have one from the main office to a small town about eight miles

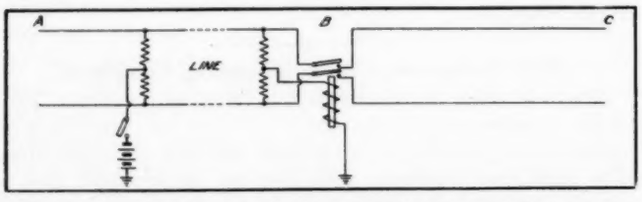


Fig. 1. Circuit for Automatically Connecting Two Metallic Lines.

from here (No. 12 iron wire). We also have a line from this small town to another town about ten miles farther south. We have an ordinary knife switch to connect these lines at the middle town. Is there any way that we could fix up a set of relays (or any other way) so this connection could be performed by the operator at the main office without disturbing the operator at the middle town? We have a pole changer with alternating and pulsating current. Any information will be appreciated.

We do not know of any device on the market for doing this work. If your lines were metallic you could simplex a relay as in Fig. 1. This allows *A* to put battery current

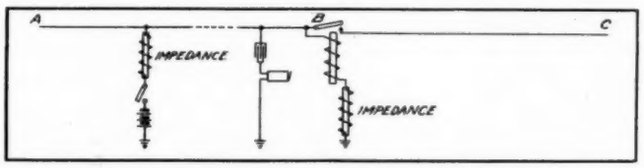


Fig. 2. Suggested Circuit for Grounded Lines.

on the line by closing a switch, pulling up the relay at *B* and extending the line to *C*. If the line is ground return, you might try Fig. 2, putting heavy retardation coils in series with battery and relay to prevent ringing current from leaking to earth. But you will get disturbance enough through the condenser to throw the drop, unless the direct current is weak.

Interference with Electric Wires.

How near would it be safe to run a telephone line to a 1,300-volt electric line? My lines are all full metallic.

How much clearance can a telephone company hold on a right of way if it has its lines built when the light company builds its lines? If the line had to be moved who would have to stand the expense?

No distance in feet can be given, as far as safety is concerned. Be sure that the telephone wires are no higher than the power line, so that if one breaks it cannot fall onto the high voltage wires. So far as noise is concerned, much will depend on your switchboard and other connections as well as the transpositions and insulation of your metallic circuits. It is well to stay on the opposite side of the road, perhaps 30 or 40 feet away.

The general rule that has been thoroughly sustained by weight of authority upon the question of interference by the electrical wires of one company with the wires of another electrical company may be stated as follows:

"As between different electrical companies prior authority of one of the companies to occupy, or prior occupation of the streets, will not confer upon such company an exclusive right. The right of the prior licensee, however, must not be subsequently injured by the late company. Such subsequent licensee is under the duty to so maintain its lines and wires as not to interfere with the right of the prior occupant of the streets to properly maintain and operate its lines and to transact the business which it is authorized by its franchise to transact."

In some cases courts have held that the electric wires should be four feet from the telephone wires. In another case where the electric light company had placed its wires on the same side of the street and only two feet above the telephone wires, the court held that there was danger in the position of the wires and that the electric light company was the wrong-doer. It was ordered to transfer its wires to the other side of the street.

Under these rules, if the line has to be moved, the electric light company would undoubtedly have to stand the expense.

Addition to Plant at Grand Rapids, Mich.

The Citizens' Telephone Co., of Grand Rapids, Mich., is building an addition, 23 by 46 feet, to its plant for use as a garage and storehouse. The addition is two stories in height and of fireproof construction.

The Library Relating to Your Particular Business

Value of a Growing Collection of Business Books Kept in an Accessible Place—Knowledge from Experience and from Books—Reading of Good Business Literature Should be Encouraged by Employers —Trade Papers an Important Feature of Library

By Frank Farrington

You are perhaps the one man in a hundred who appreciates the value of business literature and spends more or less money every year to add to his collection of business books. You may realize the value of having at hand the collected ideas of other men who have made a study of business methods. Yet it is likely that you do not regard what business literature you have in the light of a library.

Perhaps nothing is gained by calling your collection of business books a library. Yet I believe it does give it added importance to allow it that dignity. And more than that, if you habitually consider your business literature in that concrete way, you will be more likely to give it the care and the attention it deserves. A miscellaneous aggregation of books, scattered here and there around the place, will fail to attract the attention the books deserve, either as individuals or as a class. Under such conditions it is left for each book to make its appeal alone. Probably each book will be lost to sight much of the time, because there is no place where it belongs.

The lawyer, the preacher, the doctor, each has his library which is nothing more than a business library built up for the benefit of his profession. He has a place for his books, and he keeps them there in good order so he can find what he wants when he wants it. Failure to arrange his books in an orderly manner renders his library of little value, or perhaps even worthless in the emergency. Proper arrangement gives the books 50 per cent. more value for actual use; and the collection of the books into the physical form of a library, gives them a further value for the effect they produce on the mind of the visitor, and for the influence they possess over the mind of the owner.

The same rules that apply to the professional man's business library, apply similarly to your business library. The main difference between your library and the doctor's is in the number of volumes. For you to think that you can achieve perfection in business ability merely by adding to your store of knowledge those facts and ideas you pick up in your own experience, is the same as for the doctor to think he can develop fast enough, through his own observations and discoveries, to keep pace with the medical developments of the day. If we are going to get anywhere near the top in any line of endeavor, professional or otherwise, we must profit by what other men have done. We must make use of the brains of other people. Our own little experiences are valuable to us and they teach us much, but they are limited. We appreciate this as soon as we begin to investigate the experiences of others.

Your Growing Collection of Business Books.

In every office, shop or store there ought to be a growing collection of business books. These books ought to be kept in a suitable case, or on suitable shelves, where they will be easily reached by anyone connected with the business. The business may be so small that it is a one-man affair sometimes. But, even so, the library is none the less important, perhaps I should say it is all the more important. If the business is large and the employes many, the library ought to be correspondingly large and divided or duplicated so that separate departments or rooms or floors shall have each its own library.

Whatever the business, whatever the managing, operating or selling conditions, there ought to be good business literature kept within reach of the help—and of the employer. The employes will be benefited by reading good business literature, and it will pay them to take an interest in that kind of reading, but the manager must read. The business cannot be a real success without the aid of business literature.

Daily Use of Business Library.

In practically every business, there are times during the day when the employer and the employe can find time to do a little reading, if only during the dinner or supper hour. During the times when one must let down, instead of merely loafing, it pays to read something out of the business library. If a man wants to get ahead, he can do it with the aid of good business books. If he does not want to get ahead—well, he will not be reading this.

The positions in offices and shops are filled to too large an extent with people who are simply waiting and hanging on. They are living from week to week, with nothing more than a vague hope that sometime, somehow, luck will come their way. As a matter of fact, they give little thought to what they are going to do or become. It is perhaps the fault of the employer that his employes are not oftener reminded of the fact that they have in their own hands the making of their future, and that one thing which will do more than anything else to develop their power and their ability, is the reading of good business literature.

It is not necessary to have even a "five-foot" shelf of business books. A five-book business library will make a starter for the small business, and a dozen well chosen books will make an assortment that will cover a very good business education for the average man, if he gets all that is in them. When the force is large enough so that a dozen books will not suffice, the dozen may be duplicated. Of course, it is wise to add to the collection such new and desirable books as are published from time to time. Unfortunately the method by which most men buy business books, is to order when compelled to do so by the insistence of a canvasser, or when a printed advertisement is so forceful as to leave no loophole of escape. Instead of buying only when forced into it, a man should constantly have his eyes open for an opportunity to add a new, valuable book to his business library. Every good, new business book means new opportunities for the reader. He ought to be looking for opportunities, instead of sitting back waiting for them to find him.

There are lines along which all business men need to study. It is important that we learn better business methods of all kinds, and that we develop higher degrees of efficiency. There are books that cover all the departments of your business and no one can read them without being made worth more money in salary or in profits.

The editor of any good trade paper, or business magazine, will advise a subscriber as to what books are best for him to buy for use in his business library. In fact, practically all business books can be bought from the publishers of the trade paper. If you know of a book you want, send the price to the trade paper and you will get the book, postpaid, with no inconvenience to yourself. My advice to the man who has never made a start toward a business library is to ask his trade paper editor to name for him in the order of importance, the best five or ten books for him to buy.

While it is important to buy the books, it is more impor-

tant to get them read. The attitude of the employer or manager should not be that the employes are the only ones to do the reading. The boss himself needs development as much as anyone under him. We are all on our way up or down. The question as to which, can be very nearly answered by noting whether we are or are not readers of business literature.

There ought to be a willingness to read business literature, and this willingness ought to amount even to anxiety. We ought all to be anxious to get ahead and anxious to find means of doing so. The key to success is knowledge. Some knowledge we can get by our own experience, but more we can get from books. The book route to success is so much easier than the haphazard, pick-it-up-as-you-go-along way, that it ought to be the only way.

This business library ought to be a circulating library to the extent that everyone in the place shall be allowed to take any book home to read. Employes ought to be encouraged to do such reading outside. They ought to be shown its great advantage to them. When the average employe is asked by the manager to do anything like that, his first thought is likely to be that he is being crowded into extra effort. His first thought ought to be that he is being shown the way to make good, to develop into something more than an employe.

It is possible to devise a study course based on the business library, by means of which those who take an interest in the reading may be given a sort of examination on the subjects covered. Some employes will not take kindly to this and it, perhaps, should not be made compulsory, but the right kind of help will realize its importance as an aid to development. It ought to be obvious to every employe worth having, that the great benefit in such things comes to the man who does the studying rather than to his employer.

A simple little plan which will have a tendency to develop interest in the business library, as a reading course, is to arrange a point system by which on a blackboard, made for the purpose, each employe will be listed with points opposite his name indicating the number of books read. If the books are of a uniform size, each might be represented by five points and a total kept on the board to represent the number of books read by each person. This would act as a stimulus by making public to the rest of the force, what each one has read. It might even be feasible to offer a prize, or a premium in the form of a new book, to each one having read all the books in the library. A monthly meeting for the discussion of the contents of each book would be valuable and have the tendency to prevent any employe claiming to have read a book not actually read.

A most important feature of the business library should be the trade papers. It is not enough to read business books. There is much in the trade press and technical and business periodicals that never gets into a book. In addition there is the news of the trade that will keep a man informed in regard to his work and the state of the market.

Some employes take the position that it is not their business to keep themselves informed, that they are merely employes and all they have to do is to perform their allotted tasks. This may be theoretically correct, but when it comes time to raise wages, or when it comes time to choose which employes shall be kept while others are discharged, the fortunate ones will be those who have tried to see how much they could learn about the business rather than how little. And when another employer is looking for a man suitable to make into a manager, or when the present employer wants to advance a man to a managership, the one recommended is certain to be he who has studied the trade papers and informed himself of trade conditions.

It is not enough to take merely one trade paper and keep it on file, even though it is the best of its kind. There ought to be a representative line taken, covering all branches of the work of the house. The trade paper is today so essential a part of the business development of its readers that it is almost conservative to say that a business man will succeed in direct proportion to the amount of attention he gives such papers.

The trade papers ought to be the important features in every business library taken in sufficient numbers so the employes may have an opportunity to read them, either at the office or by taking copies home. Many employers subscribe for extra copies to go to the homes of interested employes and the expense, which might at first glance seem extravagant, is in reality insignificant in contrast with the results produced. Any employe who can thus be induced to read a trade paper will return the business a hundredfold on the cost of the subscription. Trade papers, like business books, make more efficient service and result in increased return.

The business library will be the best paying investment the house ever made if care and intelligence are used in the choice of the literature and of the methods for getting it read.

Annual Meeting of Blue Springs (Neb.) Company.

The report of the secretary of the Gage County Independent Telephone Co., of Blue Springs, Neb., presented at the annual meeting of the company, showed the revenue for the past year to be $8,518 and the expenses $6,574, leaving a balance of $1,944. The receipts show a gain of $311 over the previous year. The company now has a total of 568 subscribers, a gain of 22 over the preceding year.

Officers and directors for the ensuing year were elected as follows: President, J. H. McPheron; treasurer, R. B. Clemens; directors, for three years, J. B. Reiff and George Harpster; for two years, H. O. Williams; auditor, V. Trump.

Laying Cable Across the Mississippi.

The Cumberland and the Southwestern telephone companies have just completed the laying of a cable across the Mississippi river at Greenville, Miss., connecting the two telephone systems from Greenville to Lake Village, Ark., and giving Greenville direct connections with points in Arkansas, Oklahoma and Texas.

The cable is 3½ inches in diameter and contains 20 wires. The cable across the river there weighed 79,000 pounds. The connecting circuits on the Mississippi and Arkansas sides of the river and the cable cost the telephone companies $25,000.

Valuation of Telephone Properties in Missouri.

The total valuation of telephone properties in Missouri, as fixed by the state tax board, is placed at $12,484,260, as compared with $11,626,394 last year. Four of the large telephone companies have increased valuations, the total valuation of the Kinloch Telephone Co., of St. Louis, being $762,723, an increase of $16,398 over last year; the American Telephone & Telegraph Co., $999,150, an increase of $215,544; the Kansas City Home Telephone Co., $1,365,907, an increase of $128,069 and the Southwestern Telegraph & Telephone Co.

Ohio State Earnings for September.

The unassigned balance of the Ohio State Telephone Co., Columbus, Ohio, for September, $44,871, exceeds that of August by more than $4,000, and is $14,000 above that for July. Officials of the company declare that earnings for the month indicate a decided response to the general business situation, which is improving in all sections.

The gross revenue for the month totaled $275,652, with expenses of $158,208, producing a net income of $117,444. Deduction of fixed charges resulted in net earnings of $70,959, against $66,215 for August and $56,516 for July.

From Factory and Salesroom

Conventions: Canadian, Toronto, Nov. 10-11; Missouri, Kansas City, Nov. 16-17; Ohio, Columbus, Nov. 18-19; Joint Convention of National Associations, Chicago, Dec. 8-10; South Dakota, Sioux Falls, Dec. 15-16; Minnesota, Minneapolis, Jan. 25-26; Wisconsin, Madison, Feb. 9-11

A High Tension Guy Clamp.

A new high tension guy clamp has recently been placed on the market by the Gund Mfg. Co., of LaCrosse, Wis. The body of the clamp is split lengthwise into two halves and is fitted over the guy wire. The outside of the clamp has a tapered thread, being larger in the middle and smaller at both ends. The nuts also have a tapered thread and as they are screwed towards the middle they cause the two split halves of the clamp to tighten. The taper is ten to one. This means that the nut has to be screwed up an inch while the clamp closes only one-tenth of an inch. It is contended that the actual clamping power is ten times as great as on the ordinary clamp.

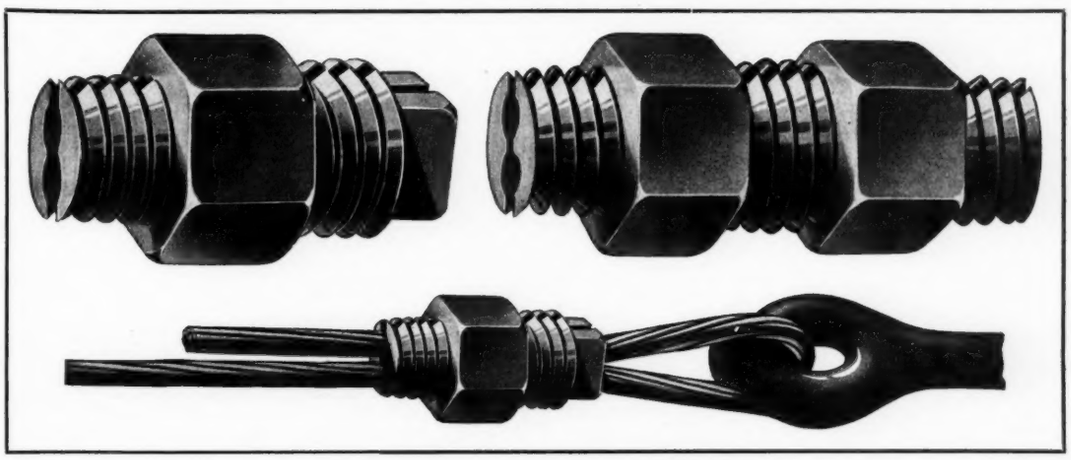
The guy clamps are made in two styles: Single clamps with one nut for all sizes guy wire and strand up to ⅜ in.; double clamps with two nuts for ⅜ in., 7/16 in., ½ in. and ⅝ in. strand.

To install the clamps, the nut is threaded over the strand and the block and tackle applied in the ordinary way to remove the slack. The nuts act as a ring to keep the wires together and eliminates the necessity of driving down.

It is contended that the Gund high tension clamp can be installed in one-tenth the time ordinarily required for placing other types of clamps.

A Wisconsin telephone company, in writing to the Gund Mfg. Co. relative to the new clamp, states that it has given the clamp a very thorough trial in connection with ⅜ in. strand. The strand broke but the clamp did not budge.

The company will be pleased to send literature and further particulars relative to its new guy clamp to those interested.



Gund High Tension Guy Clamps Showing Method of Attachment.

Kansas City Broad Office Cut-Over.

The new Kellogg equipment at the Kansas City Home Telephone Co.'s Broad office was cut into service May 22, and by the following morning the old board had been entirely dismantled and removed from the operating room. At this writing the new Broad equipment has been in service for four months and the idea, sometimes advanced, that the introduction of automatic ringing, automatic listening, secret service and similar modern features requires the re-education of the telephone users has been thoroughly exploded.

No notices of any kind were sent to the Broad office subscribers, and on the morning following the cut-over they were agreeably surprised at the wonderful improvement in transmission, and those slow in answering merely attributed the periodical ringing to the operator's persistence. Gradually they learned that this ringing is being done automatically; that the operator has no control over it, and that the only manner of stopping the periodical ringing is for them to answer the call. Service is thus becoming more prompt, and the average connected time for all calls is being greatly reduced.

Greater Kansas City has grown to such proportions that transmission through long cable calls is becoming a problem with both companies, and the new Broad equipment was purchased primarily to secure better transmission to and from the various other exchanges, including the Independence office, which is over 20 miles distant from many of the Broad office subscribers.

With the same telephones which were in service in the old board and the same local and trunk cables, the transmission within the Broad exchange and from Broad to the farthest offices and to "long distance" is all that the telephone company and their patrons could desire. This proves that in common battery work the correct design of the switchboard equipment and the use of efficiently designed apparatus for battery feeds has as much or more to do with good transmission as the telephones themselves.

The present Broad equipment comprises two steel frame quartered-oak sections, having capacity for 10,800 lines on an eight-panel multiple, and arranged and numbered for 7,200 lines, which is intended as the ultimate capacity of the Broad exchange. A "B" position with 40 incoming trunks is provided, this unusually large number per position having been made possible by the automatic features which afford speedier operation.

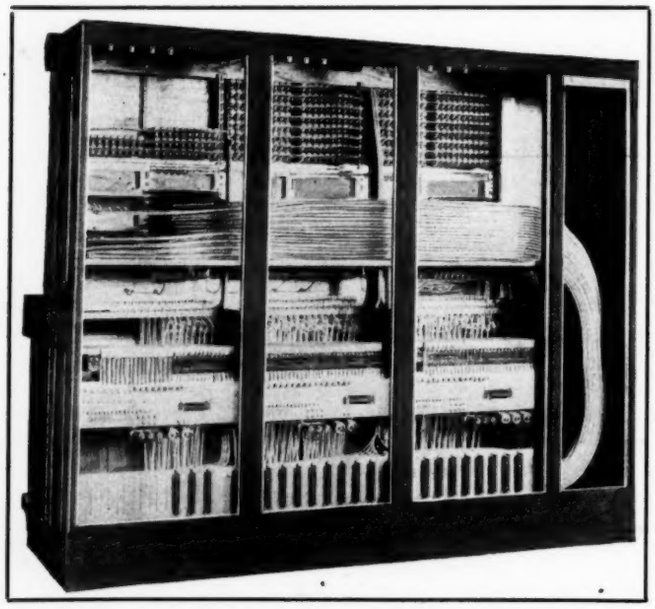
Three local positions are provided with 15 cord circuits each, handling at the present time, a total of 500 local lines and 40 outgoing trunks. As this exchange is without party lines, no ringing keys have been furnished, both ringing and listening being accomplished automatically by the cord circuit relays.

In order to insure efficient service both in and out of the Broad office, the Kansas City Home company had the Kellogg company overhaul the Broad trunks in its Main, East, South, West, Linwood and Independence offices, fitting all with Kellogg high efficiency trunking equipment.

A cordial invitation is extended all telephone men in the southwest to plan their visits or stop-overs in Kansas City, so they can devote a couple of hours to an inspection of this modern Kellogg central office equipment which the Kansas City branch will be glad to show.

New Cracraft-Leich Board at Mechanicsburg, Ohio.

The Mechanicsburg Telephone Co., of Mechanicsburg, Ohio, has recently placed in operation a magneto multiple switchboard manufactured by the Cracraft-Leich Electric Co., Genoa, Ill. The switchboard has a capacity for 480 lines and is provided with the Cracraft-Leich company's electrically restored drop signal. This drop makes it possible for operators to give extremely rapid service as the multiple jacks are placed immediately in front of the operator and not associated with the drop as is the usual practice in ordinary magneto multiple boards.



Rear View of Cracraft-Leich Switchboard.

The arrangement of the multiple is such that no operator is required to reach beyond the first panel of the adjacent operator's position and makes extremely rapid and efficient service possible. In fact, some exchanges using the C-L magneto multiple switchboard have a record of 225 completed calls per operator per hour. This corresponds very favorably with records obtained on the latest type of common battery switchboards.

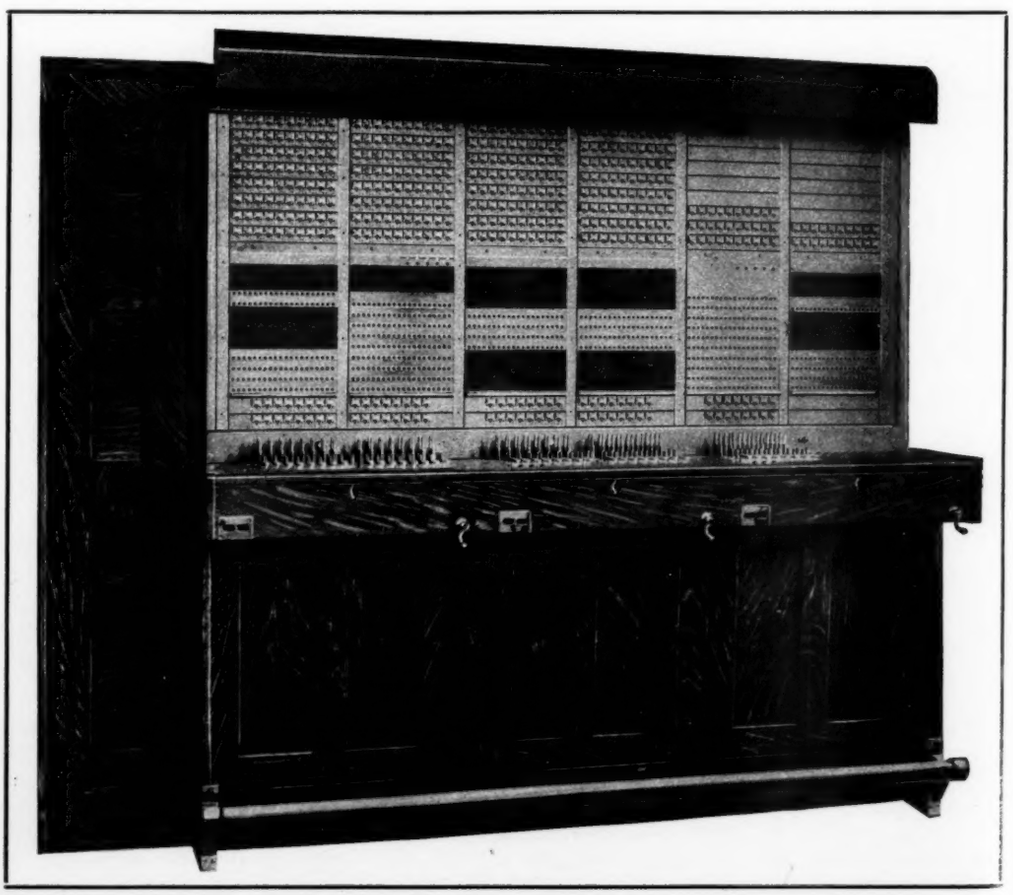
At present 370 line drops are installed in the board, of which 40 are for farm lines and 10 for toll lines. The farm lines are distributed throughout the board in order to equalize the load and are considered as regular lines. This arrangement can readily be obtained because of the simplicity of the circuits. All cord circuits are identical and any cord pair in the board can be used for connecting local, farm or toll lines, and by employing the Leich Automaphone in the city, common battery service can be rendered at very much less expense than when a complete common battery plant is installed. Each cord pair is provided with an individual party line ringing key and the third or toll position is provided with standard recording trunks so that later the toll business may be handled from a separate switchboard.

The rear of this board is also extremely simple as will be noted from the accompanying illustration. All lines are terminated in the bottom of the board on terminal strips and common battery practice of the most modern type has been used for the cabling of the line signals and multiple jacks. The battery current for the operators' sets, restoring coils on the drops and pilots, is supplied from duplicate sets of 40-ampere hour storage batteries which are charged by means of a motor generator set.

Because of the absence of all relays and owing to the low current consumption of the board, the maintenance expense naturally is lower than for any other type of board which will give the same class of service. A plant of the type just described, it is contended, makes the highest class of telephone service possible and will show a much lower maintenance expense and a greater net income than any other system.

Phoney Bill's Views on Thanksgiving.

Seated at the fireside, Phoney Bill is shown on this month's blotter calendar of the Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., enjoying his "after dinner" smoke. With Thanksgiving but a few weeks away he is thinking of the many things we have to be thankful for. For a moment he has cast aside the evening paper and in his mind pictures war scenes about which he has been reading. "Let's be thank-



Cracraft-Leich Magneto Multiple Switchboard Installed at Mechanicsburg, Ohio.

ful we live in the United States" Phoney Bill's soliloquizes as he compares our business difficulties with the horror and suffering on the battlefield. Business may not have been up to par the past year but the outlook for the future is bright and all will agree with our friend, Phoney Bill, that we

We Have Much to Be Thankful For.

have much to be thankful for. Phoney Bill is glad he can be sure of the ground he is on and that he can enjoy a peaceful smoke after a good day's work in boosting "Quality Apparatus."

New Wireless Cable Tester Instructions.

The Electric Specialty Mfg. Co., Granby Block, Cedar Rapids, Iowa, announces that users of the wireless cable tester who have not yet received the 1915 instruction booklet should advise the company to that effect, and a copy will be mailed promptly. The company states that there are some special features in this booklet that will prove of value to all connected with cable maintenance.

Paragraphs.

THE LINDSLEY BROTHERS Co., of Minneapolis, Minn., will open a Southwestern sales office in St. Louis, Mo., in the near future, to take care of its trade in Missouri, Kansas, Oklahoma, Texas, Arkansas, Louisiana, Tennessee and southern Illinois. This office will be in charge of Frank O. Grayson, with headquarters at 405 LaSalle Building.

JULIUS ANDRAE & SONS Co., of Milwaukee, Wis., recently celebrated the 55th anniversary of the company's advent into the telephone and electrical business. In 1860 Julius Andrae opened a little blacksmith shop on West Water street. In a few years the little shop was crowded with work, necessitating the removal of the business to larger quarters. Through the succeeding years the business has outgrown four homes, each of which, upon occupancy, was considered adequate for all time. The present quarters of the company are at Broadway and Michigan street, Milwaukee, in addition to which it has a number of warehouses throughout the city.

Book Review.

PRINCIPLES OF DIRECT CURRENT MACHINES, by Alexander S. Langdorf. Published by McGraw-Hill Book Co., New York; 404 pages, 5 ins. by 8 ins.; over 300 illustrations. Price $3.

This is the first volume of a series of electrical engineering texts, the others of which will be issued from time to time. These volumes are outlined by a committee consisting of nine well known electrical engineers, many of whom are engaged in teaching. They are: Harry E. Clifford, chairman and consulting editor; Murray C. Beebe, Paul M. Lincoln, George W. Paterson, Elihu Thomson, Ernest J. Berg, Henry H. Norris, Harris J. Ryan and William D. Weaver.

In this volume of the series, Prof. Langdorf, who is dean of the Schools of Engineering and Architecture, Washington University, St. Louis, presents a reasonably complete treatment of the fundamental principles that underlie the design and operation of all types of direct current and machinery. Some topics are given more attention than is usually devoted to them as the author believes they are essential to a thorough grasp of the subject. These parts include: A full derivation of the rules covering armature windings; new material concerning the operating characteristics of generators and motors; and an extensive treatment of commutation.

Methods of calculus have been freely used but at the same time special prominence is given to the physical concepts of which the equations are merely the short hand expressions. Mathematical analysis has been preceded where possible by a full discussion of the physical facts of the problem and their relation to one another. Illustrative examples follow the text matter of each chapter.

The book has been specially prepared with a view of the needs of junior and senior students of electrical engineering. Others who desire to review the subject will find in this volume a most useful aid.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

B. F. MACMAHAN, of Winchester, Ky., has been appointed manager of the Cumberland Telephone & Telegraph Co. at Nicholasville, Ky.

A. A. DYE, for the past five years manager of the Wisconsin Telephone Co., at Kenosha, Wis., has taken a position with the construction department of the company at Milwaukee.

W. G. READ, formerly manager of the Butler-Rich Hill Telephone Exchange, of Butler, Mo., has recently been appointed assistant engineer of the Kansas Public Utilities Commission in charge of telephone matters.

D. B. WILLIAMS, formerly manager for the Cumberland Telephone & Telegraph Co. at West Point, Ky., has been assigned to a similar office at Springfield, Ky. L. M. Potts, of Shelbyville, Ky., has succeeded him at West Point.

L. R. CHINN, for the past six years manager of the Southwestern Telegraph & Telephone Co., at Kirksville, Mo., has been transferred to Hannibal, Mo., where he will act in the same capacity. He is succeeded by C. W. Morgan, who has been wire chief for the Kirksville district for 18 months.

H. C. FOLLETT, for the past two years local manager of the New York Telephone Co., at Le Roy, N. Y., has been promoted to the Rochester office where he will act as general agent for the commercial department. J. S. Wilkin, manager of the Brockport exchange, will succeed Mr. Follett at Le Roy. The Le Roy division, which includes Bergen, Pavilion and Churchville, has been enlarged to include Brockport.

New Companies and Incorporations.

HUGHES, ARK.—The Beck Telephone Co. has been organized. The officers are J. O. Beck, president; R. H. Polk, vice-president, and T. R. Porter, secretary-treasurer.

DANVERS, ILL.—The Danvers Telephone Co. has been incorporated with a capital stock of $5,000. The incorporators are Kilbert Wiley, Rosa Wiley and Charles T. McKinney.

PERRY, ILL.—The Perry Telephone Co. has been incorpor-

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embrace the refined effort of the world's best telephone engineers and represent a standard of excellence and efficiency that is "finis" in telephone engineering. The satisfaction which inevitably results from their use is the overwhelming measure that money buys when it buys COOK'S PROTECTIVE APPARATUS.

May our salesman show you where you can invest your money to the best advantage this fall?

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As wire will test best, so also will it last best and give better satisfaction while it lasts.

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IT'S THE ONE BEST PROVEN BY TEST.—*TRY IT.*

Handled by most representation jobbers and supply houses.

Write for samples, test and compare.

INDIANA STEEL & WIRE COMPANY
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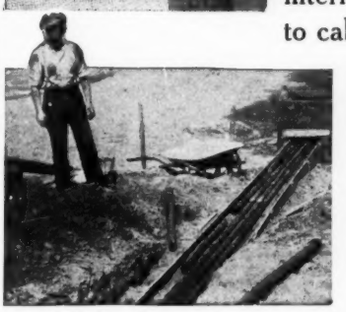

FROM EVERY POINT

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Book H contains valuable data.

THE FIBRE CONDUIT COMPANY
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ated with a capital stock of $2,500. The incorporators are John Johnson, Jas. H. Hill and Geo. Wagner.

PLAINVILLE, IND.—C. R. Head of the Pike County Telephone Co. has purchased the controlling interest in the Plainville Telephone Co.

STANFORD, KY.—The Logan's Creek Telephone Co. has been incorporated with a capital stock of $450. The incorporators are Frank P. Spoonamore; J. C. Pelles and W. P. Logan.

HEMLOCK, MICH.—The Hemlock Home Telephone Co. has been organized with F. A. Schulte as general manager.

HAVERHILL, MINN.—The Farmers' Telephone Co. has been incorporated, with a capital stock of $2,000. The incorporators are E. E. Dodge, Orin Pike and S. B. Shonyo.

REED POINT, MONT.—The Reed Point Mutual Telephone Co has been incorporated with a capital stock of $1,250. The incorporators are: B. T. Denney, E. A. Austin and Newton Lay.

Construction.

NORTH VERNON, IND.—The Kennings County Telephone Co. is arranging to place in cable all of its circuits in the business district, at a cost of approximately $5,000.

MADISONVILLE, KY.—B. C. Mitchell, manager at Madisonville, of the Cumberland Telephone & Telegraph Co., has submitted an estimate to the headquarters of the company on the cost of cabling all the wires of the company within the city limits; and the proposition to make such improvements is being considered.

OWENSBORO, KY.—A program of improvements has been announced for Owensboro and vicinity, by the Cumberland Telephone & Telegraph Co., which provides for overhauling and renewal of the local and toll lines in this part of the state. The exchange in Calhoun, Ky., is to be overhauled, switchboard rebuilt and put in new working order; and the lines between the two towns will be reconstructed. C. Blake Jacobs is manager of the Owensboro exchange.

Elections.

COLUMBIA CITY, IND.—The Whitley County Telephone Co. has elected officers for the ensuing year as follows: James D. Adams, president; F. F. Morsches, vice-president; Mrs. Mary Magley, secretary and treasurer; John C. Pentz, general manager.

HONEY CREEK, IND.—The Honey Creek Mutual Telephone Co. elected the following officers at its annual meeting which was held recently: Charles B. Rigney, president; George L. Woodsmall, secretary; Thomas M. Snodgrass, treasurer; and Riles Sutcliff, Edward Boyll, L. H. Gunn, C. P. Liston, C. H. Siner, H. Voges, Jr., Jacob Jones and C. Kennett, directors.

WILTON, IOWA—The Wilton Telephone Co. has elected the following officers: President, C. H. Wilson; vice-president, Fred Maurer; secretary, H. E. Strong, and treasurer, W. D. Harris.

AUBURN, KY.—At the annual meeting of the stockholders of the Auburn Home Telephone Co. the following directors were re-elected: B. D. Williams, A. McCarley, W. H. McKenzie, P. B. Elliott and T. D. Hamblin. At a subsequent meeting of the directors the following officers were re-elected: B. D. Williams, president; A. McCarley, vice-president; W. H. McKenzie, secretary and treasurer. The annual report showed the business to be in good condition.

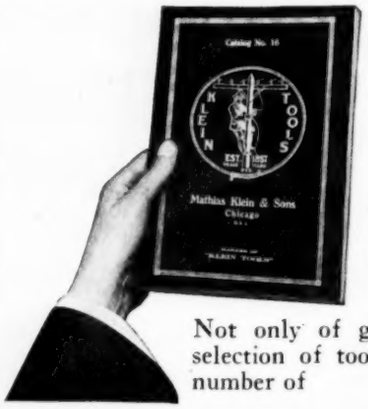
KIDDER, MO.—At the annual meeting of the Home Mutual Telephone Co., of Caldwell county, the following officers and directors were elected for the ensuing year: Judge A. F. Howard, president; E. P. Writt, vice-president; Roscoe L. Terry, secretary; J. N. Gittinger, treasurer; H. L. Buck, H. S. Knoch, J. V. DeWalt, Jesse Ream and R. M. Tuttle, directors.

LIBERTY, NEB.—The Liberty Telephone Co. has elected the following officers for the ensuing year: President, A. E. Burgett; vice-president, F. Shannon; secretary, C. Douglas; and treasurer, O. Dalton.

Financial.

AUBURN, KY.—The Auburn Home Telephone Co., at its annual meeting, declared a dividend of 10 per cent., payable November 1.

BUFFALO, N. Y.—The Federal Telephone & Telegraph Co. has declared a quarterly dividend of 1¾ per cent., payable November 15 to stockholders of record November 5.



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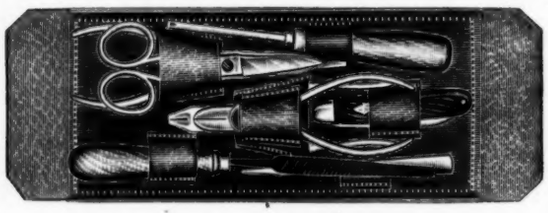

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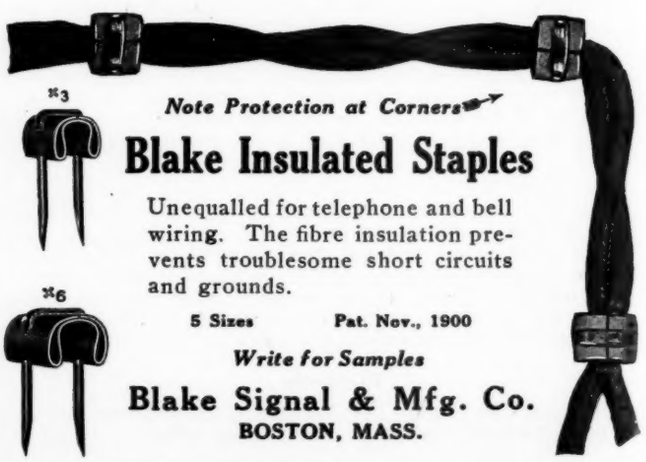

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